



REFERENCE STANDARD RS 13
MECHANICAL VENTILATION, AIR CONDITIONING, AND REFRIGERATION SYSTEMS

*** LIST OF REFERENCED NATIONAL STANDARDS**

**NFIPA 90A	Standard for the Installation of Air Conditioning and Ventilating Systems, As Modified....	1996
ANSI/ NFIPA 96	Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.....	1984
***NFIPA 90B	Standard for the Installation of Warm Air Heating and Air Conditioning and Ventilating Systems, As Modified	1996
ANSI/ NFIPA 91	Standard for the Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal Conveying.....	1973
† ANSI/ASHRAE 15	Safety Standard for Refrigeration Systems.....	2001
ANSI Z263.1/ UL 207	Standard for Refrigerant-Containing Components and Accessories Non-Electrical..	1982
ANSI Z262.1/ UL 303	Standard for Refrigeration and Air-Conditioning Condensing and Compressor Units, Revision March 1982.....	1980
ANSI B136.1/ UL 353	Limit Controls, Revision November 1976.....	1974
ANSI Z226.1/ UL 372	Standard for Primary Safety Controls for Gas and Oil-Fired Appliances. Revisions September 10, 1976 and September 3, 1980.....	1975
ANSI B144.1/ UL 465	Standard for Central Cooling Air Conditioners. Revision May 1981.....	1978
ANSI C33.14/ UL 484	Room Air Conditioners.....	1982
ANSI B191.1/ UL 559	Standard for Heat Pumps. Revision October 1981.....	1975
ANSI Z251.1/ UL 883	Standard for Fan-Coil Units and Room Fan-Heaters. Revision February 1982.....	1980
ANSI B124.1/ UL 900	Standard for Test Performance of Air Filter Units. Revision December 1980.....	1977
ANSI/ NFIPA 17	Standard for Dry Chemical Extinguishing Systems.....	1980

Note 1: Wherever in these standards reference is made to NFIPA 70, National Electrical Code, the work so covered shall meet the requirements of the Electrical Code of the City of New York.

Note 2: Wherever in these standards reference is made to the authority having jurisdiction, substitute "to the Commissioner."

* 913-82 BCR

**DOB 5-4-02; Local Law 16-1984

***DOB 5-4-02

† DOB 4-27-05

***** REFERENCE STANDARD RS 13-1**

NFiPA No. 90 A-96, as modified, Standard for the Installation of Air Conditioning and Ventilation Systems.

Those provisions of ANSI/NFiPA No. 90 A-96 as herein set forth with the modifications thereto shall constitute Reference Standard RS 13-1.

The appendices to ANSI/NFiPA No. 90 A-96 are not part of this Reference Standard. These are for informational purposes only, and are not reproduced here.

Wherever reference is made to the "National Electrical Code" it shall be changed to read "Electrical Code of the City of New York."

The New York State Energy Conservation Construction Code also regulates the design and construction of heating, ventilating, and air conditioning systems in New York City.

STANDARD FOR THE INSTALLATION OF AIR CONDITIONING AND VENTILATION SYSTEMS
ANSI/NFiPA No. 90 A-1996, AS MODIFIED

Indicates where text deviates from ANSI/NFiPA No. 90A – 1996. Section numbers are from ANSI/NFiPA No. 90A – 1996.

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CHAPTER 1 - GENERAL

1-1 Introduction. - An air duct system has the potential to convey smoke, hot gases, and flame from area to area and to supply air to aid combustion in the fire area. For these reasons, fire protection of an air duct system is essential to safety, to life and the protection of property. However, an air duct system's fire integrity also enables it to be used as part of a building's fire protection system. (*See Section 1-4*)

1-2 Scope. - This standard shall apply to all systems for the movement of environmental air in structures that are not otherwise exempted by Section 27-777(b) of the Administrative Code.

1-3 Purpose.

1-3.1 This standard is intended to prescribe minimum requirements for safety to life and property from fire. These requirements are intended to:

(a) Restrict the spread of smoke through air duct systems within a building or into a building from the outside.

(b) Restrict the spread of fire through air duct systems from the area of fire origin whether located within the building or outside.

(c) Maintain the fire-resistive integrity of building components and elements such as floors, partitions, roofs, walls, and floor/roof-ceiling assemblies affected by the installation of air duct systems.

(d) Minimize ignition sources and combustibility of the elements of the air duct systems.

(e) Permit the air duct systems in a building to be used for the additional purpose of emergency smoke control.

1-3.2 Nothing in this standard is intended to prevent the use of new methods or devices, provided that sufficient technical data is submitted to the Department of Buildings to demonstrate that the proposed method or device is equivalent in quality, strength, durability, and safety to that prescribed by this standard.

1-3.3 The provisions of this standard are not intended to be applied retroactively. Where the system is being

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altered, extended, or renovated, the requirements of Article 4 of Subchapter 1 of Chapter 1 of Title 27 of the Administrative Code shall govern the applicability of this standard.

1-4 Maintenance. –The appropriate provisions of the Building Code shall apply.

1-5 Definitions.

Accepted - Means "Accepted" by the Materials and Equipment Acceptance Division of the Department of Buildings.

NOTE: The MEA Division is the "authority having jurisdiction" in use of materials, assemblies, forms, methods of construction, and service equipment subject to the acceptance requirements of Building Code Sections 27-131 and 27-135.

Air Cleaner - A device used to reduce or remove airborne solids from heating, ventilating and air conditioning systems by electrostatic means.

Air Distribution System - A continuous passageway for the transmission of air that, in addition to air ducts, shall be permitted to include air connectors, air duct fittings, dampers, plenums, fans, and accessory air handling equipment, but that does not include conditioned spaces.

Air Duct - A conduit for conveying air.

Air Duct Connector - A conduit for transferring air between an air duct or plenum and an air terminal unit or an air inlet or an air outlet. (*For limitations on use of air connectors, see Section 2-3.2.1.*)

Air Duct Covering - A material such as adhesive, insulation, banding, a coating(s), film, or a jacket used to cover the outside surface of an air duct, fan casing, or duct plenum.

Air Duct Lining - A material such as an adhesive, insulation, a coating(s), or film used to line the inside surface of an air duct, fan casing, or duct plenum.

Air Filters - A device used to reduce or remove airborne solids from heating, ventilating, and air conditioning systems by mechanical means.

(a) A Class 1 air filter is one which, when clean, does not contribute fuel when attacked by flame, and emits only negligible amounts of smoke when tested in accordance with RS 13-15.

(b) A Class 2 air filter is one which, when clean, burns moderately when attacked by flame or emits moderate amounts of smoke or both when tested in accordance with RS 13-15.

Air Inlet - Any opening through which air is removed from a space and returned to an air distribution system.

Air Outlet - Any opening through which air is delivered to a space from an air distribution system.

Air Terminal Unit - An appliance receiving, conditioning, and delivering air supplied through an air distribution system.

Air Transfer Opening - An opening designed to allow the movement of environmental air between two contiguous spaces.

Approved - See subchapter 2 of the Building Code for definition.

Authority Having Jurisdiction - Means "The Commissioner of the Department of Buildings" or his designee.

Blower - A fan used to force air under pressure through an air duct system.

Ceiling Damper - A device installed to limit radiant heat transfer through an air outlet or air inlet opening in the ceiling of a floor/roof-ceiling assembly having not less than a 1-hour fire resistance rating. Such a device is described in the construction details for some tested floor/roof-ceiling assemblies.

Environmental Air - Air that is supplied, returned, recirculated, or exhausted from spaces for the purpose of modifying the existing atmosphere within the building.

Exhaust Air - Air removed from a space and not reused.

Exhaust System - An assembly of connected ducts, plenums, fittings, registers, grilles and hoods through which air is conducted from the space or spaces and exhausted to the outside atmosphere.

Fan - An assembly comprising blades or runners and a housing or casing that is either a blower or an exhaust fan.

Fire Damper - A device installed in an air distribution system, that is designed to close automatically upon detection of heat, to interrupt migratory airflow, and to restrict the passage of flame. A combination fire and smoke damper meets the requirements of both.

Fire-Resistance Rating - See subchapter 2 of the Building Code for definition.

Flame Spread Rating - The measurement of the comparative rate of propagation of flame over the surface of a material as determined by a fire test made in accordance with a specified standard in subchapter five of [this chapter] the Building Code.

Limited Combustible Material - A building construction material not complying with the definition of non-combustible material, which, in the form in which it is used, has a potential heat value not exceeding 3500 Btu/lb (8141kj/kg) and complies with one of the following paragraphs (a) or (b). Materials subject to increase in combustibility or flame spread index/rating beyond the limits herein established through the effects of age, moisture, or other atmospheric condition shall be considered combustible.

(a) Materials having a structural base or noncombustible material, with a surfacing not exceeding a thickness of one-eighth in. (3.2 mm), that has a flame spread index/rating not greater than 50.

(b) Materials, in the form and thickness used, other than as described in (a), having neither a flame spread index/rating greater than 25 nor evidence of continued combustion, and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread index/rating

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greater than 25 nor evidence of continued progressive combustion.

Listed - Equipment, materials or services included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment, materials or periodic evaluation of services, and whose listing states either that the equipment, material or service meets identified standards or has been tested and found suitable for use in a specified purpose.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Noncombustible - See subchapter 2 of the Building Code for definition.

Plenum - An air compartment or chamber located in one story only to which one or more ducts are connected and which forms part of the air supply or return system and may be part of the building construction such as the concealed space above a ceiling. Any such air compartment or chamber in more than one contiguous story shall meet the requirements of Section 2-3.10.

Shall - Indicates a mandatory requirement.

Smoke - The airborne solid and liquid particulars and gases evolved when a material undergoes pyrolysis or combustion.

Smoke Barrier - See subchapter 2 of the Building Code for definition.

Smoke Control - A system that utilizes fans to produce pressure differences to manage smoke movement.

Smoke Damper - A device to resist the passage of smoke which:

- (a) Is arranged to operate automatically, and
- (b) Is controlled by a smoke detector, and
- (c) When required shall be capable of being positioned manually from a remote command station.

A smoke damper may be a fire damper or a damper serving other functions, if its location lends itself to the multiple functions. A combination fire and smoke damper shall meet the requirements of both.

Smoke Detector - A device which senses visible or invisible particles of combustion.

Smoke Developed Rating - A smoke developed rating of a material refers to a number or classification of a material obtained according to RS 5-5.

CHAPTER 2 - HVAC SYSTEMS

2-1 General Requirements - Equipment.

2-1.1 Equipment shall be arranged to afford access for inspection maintenance, and repair.

2-1.2 Equipment shall be selected and installed based on its proper application with respect to the manufacturer's installation instructions and listing, as applicable.

2-1.3 Equipment shall be guarded for personnel protection and against intake or foreign matter into the system.

2-1.4 Electrical wiring and equipment shall be installed in accordance with NYC Electrical Code.

2-1.5 Equipment Location. - See Section 3-1

2-2 System Components.

2-2.1 Outside Air Intakes and Exhaust.

2-2.1.1 Outside air intakes shall be located to avoid drawing in combustible material or flammable vapor and to minimize hazard from fires in other structures.

2.2.1.2 Outside air intakes shall be protected by screens of corrosion-resistant material not larger than one-half in. (12.7 mm) mesh.

2-2.1.3 An outdoor air intake opening with gross area of more than 144 square inches (.0929 m²) shall be provided with fire dampers and smoke dampers, or combined fire and smoke dampers when such opening is located as follows:

(a) Less than 30 feet (9.145 m) above grade.

(b) Less than 30 feet (9.145 m) in any direction from any opening in another building.

(c) Less than 15 feet (4.570 m) from a lot line.

(d) Less than 50 feet (15.240 m) above and less than 50 feet (15.240 m) in any direction from a roof of combustible material or a building in which the exterior walls are constructed wholly or partly of wood.

Exception No. 1: Smoke dampers shall not be required for outdoor air intake openings installed in any construction required to have a fire resistance rating of less than two hours.

Exception No. 2: Smoke dampers shall not be required for outdoor air intake openings of systems greater than 15,000 cfm (7080L/s) which are provided with smoke dampers in accordance with 2-3.9.2 and arranged as to not introduce smoke into the building or space in which the equipment is located.

2-2.1.4 To minimize the hazard from fires and from noxious, toxic or obnoxious discharges to structures, any exhaust air discharge to the outside atmosphere shall terminate at or above the roof or setback roof of the building or in an exterior wall adjoining a street, yard or court. Exhaust air discharges shall be at least 10 feet (3.050 m) above the sidewalk or ground and shall terminate at least 10 feet (3.050 m) from any window in another building or from any window in a residential portion of the same building, or from any fire escape, exterior stair, or balcony. Exhaust system openings shall be provided with vanes or louvers constructed so as to direct the air away from windows, other openings, and pedestrians. Protection of openings in exterior walls shall be in accordance with Table 3-4 of the Building Code.

2-2.2. Air Cleaners and Air Filters.

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2-2.2.1 Electrostatic air cleaners shall be accepted in accordance with *RS 14-6*, and shall be installed in conformance with the conditions of acceptance.

2-2.2.2 Approved air filters shall have either a Class 1 or Class 2 rating in accordance with *RS 13-15*.

2-2.2.3 Liquid adhesive coatings used on air filters shall have flash point not lower than 325°F (163°C) as determined by *RS 14-13*.

2-2.2.4 Where air filters are flushed with liquid adhesives, the system shall be arranged so that the air cleaner cannot be flushed while the fan is in operation.

2-2.2.5 Liquid adhesive tanks into which removable filters are dipped should preferably be located outside the building or in a separate fire resistive room and stored in accordance with NFPA 30/96, *Flammable and Combustible Liquids Code*. Such tanks shall be of metal, equipped with tight-fitting covers and shall be kept tightly covered when not in actual use.

2-2.2.6 All air filters shall be kept free of excess dust and combustible material. Unit filters shall be renewed or cleaned when the resistance to airflow has increased to two times the original resistance or when the resistance has reached a value of recommended replacement by the manufacturer. A permanently installed draft gauge shall be provided for this purpose. Where the filters are of the automatic liquid adhesive type, sludge shall be removed from the liquid adhesive reservoir regularly.

2-2.3 Fans.

2-2.3.1 Installation. - Fans shall be installed in accordance with applicable NFPA standards and manufacturer's instructions. Fans shall be suitable for the specific installation.

2-2.3.2 Access. - Fans shall be located, arranged and installed to afford access for inspection and maintenance.

2-2.3.3 Exposed Inlets. - Exposed fan inlets shall be protected with metal screens to prevent the entry of paper, trash, and similar foreign materials.

2-2.4 Air Cooling and Heating Equipment.

2-2.4.1 Installation. - Heating and cooling equipment shall be installed in accordance with applicable NFPA standards and the manufacturer's instructions. The equipment shall be approved/accepted for the specific installation. (*See 2-3.3.1.*)

2-2.4.2 Appliances. - Materials used in the manufacturing of fan coil units, self-contained air-conditioning units, furnaces, heat pumps, humidifiers, and all similar appliances shall meet the requirements of 2-3.3.1 and 2-3.3.2. Acceptance by the MEA Division of the Department of Buildings shall be sufficient evidence of compliance with this requirement.

2-2.4.3 Mechanical Cooling. - Mechanical refrigeration used with air duct systems shall be installed in accordance with recognized safety practices and *RS 13-6*.

2-2.4.4 Furnaces. - Heating furnaces, combined with cooling units in the same air duct system shall be installed in accordance with *RS 14-2*, if gas fired, and *RS 14-3* if oil fired.

2-2.4.5 Duct Heaters. - Where electrical resistance or fuel burning heaters are installed in air ducts, the air duct coverings and their installation shall comply with the provisions of 2-3.5.3. The installation of electrical duct heaters shall comply with the Electrical Code of the City of New York.

2-3 Air Distribution.

2-3.1 Air Ducts.

2-3.1.1 Air ducts shall be permitted to be rigid or flexible and shall be constructed of materials that are reinforced and sealed to satisfy the requirements for the use of the air duct system, such as the supply air system, the return or exhaust air system, and the variable volume/pressure air system.

2-3.1.2 Air ducts shall be constructed of the following materials:

(a) Iron, steel, aluminum, copper, concrete, masonry, or clay tile.

(b) Class 0 or Class 1 rigid or flexible air ducts tested in accordance with UL 181/96, *Standard for Safety Factory-Made Air Ducts and Air Connectors*, and installed in conformance with the conditions of listing.

Exception No. 1: Class 0 or Class 1 rigid or flexible air duct shall not be used as a vertical air duct that is more than two stories in height.

Exception No. 2: Class 0 or Class 1 rigid or flexible air ducts shall not be used for air ducts containing air at temperatures in excess of 250°F (121°C).

(c) Where the temperature of the conveyed air does not exceed 125°F (52°C) in normal service, negative pressure exhaust or return air ducts shall be permitted to be constructed of gypsum board having a maximum flame spread index/rating of 25 without evidence of continued progressive combustion and a maximum smoke developed index/rating of 50.

Exception: The maximum conveyed air temperature of 125°F (52°C) shall not apply to gypsum board material used for emergency smoke exhaust air ducts.

(d) All air duct materials shall be suitable for continuous exposure to the temperature and humidity conditions of the environmental air in the air duct.

2-3.1.3 The materials, thickness, construction, and installation of ducts shall provide structural strength and durability in conformance with recognized good practice. Air ducts shall be considered to be in compliance with this requirement where constructed and installed in accordance with *RS 14-22*. Where no standard exists for the construction of air ducts, they shall be constructed to withstand both the positive and negative pressures of the system.

2-3.2 Air Connectors.

2-3.2.1 Air connectors are limited-use, flexible air ducts that shall be required to conform to the provisions for air ducts where they meet the following requirements:

(a) Air connectors shall conform to the requirements for Class 0 or Class 1 connectors when tested and

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approved in accordance with UL 181/96, *Standard for Safety Factory-Made Air Ducts and Air Connectors*.

(b) Class 0 or Class 1 air connectors shall not be used for ducts containing air at temperatures in excess of 250°F (121°C).

(c) Air connector runs shall not exceed 14 ft. (4.265 m) in length.

(d) Air connectors shall not pass through any wall, partition, or enclosure of a vertical shaft that is required to have a fire resistance rating of 1 hour or more.

(e) Air connectors shall not pass through floors.

2-3.2.2 Vibration isolation connectors in duct systems shall be made of an approved flame-retardant fabric or shall consist of sleeve joints with packing of approved material, each having a maximum flame spread index/rating of 25 and a maximum smoke developed index/rating of 50. The fabric shall have a maximum length of 10 in. (254 mm) in the direction of airflow.

2-3.3 Supplementary Materials for Air Distribution Systems.

2-3.3.1 Supplementary materials such as duct coverings, duct linings, vapor retarder facings, adhesives, fasteners, tapes, and core materials added to air ducts, plenums, panels, and duct silencers used in duct systems shall have, in the form in which they are used, a maximum flame spread

index/rating of 25 without evidence of continued progressive combustion and a maximum smoke developed index/rating of 50. Where air duct coverings and linings are to be applied with adhesives, they shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when in the final dry state, (See 2-2.4.2.)

Closure systems for use with rigid air ducts tested in accordance with UL 181/96, *Standard for Safety Factory-Made Air Ducts and Air Connectors*, shall have been tested and listed in accordance with UL 181A/94, *Standard for Safety Closure Systems for Use with Rigid Air Ducts and Air Connectors*, and used in accordance with the conditions of their listings.

Exception No. 1: This requirement shall not apply to air duct weatherproof coverings where they are located entirely outside of a building, do not penetrate a wall or roof, and do not create an exposure hazard.

Exception No. 2: Smoke detectors required by 4-4.2.

2-3.3.2 Air duct, panel, and plenum coverings and linings shall not flame, glow, smolder, or smoke when tested in accordance with similar test for pipe coverings, ASTM C411/97, *Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation*, at the temperature to which they are exposed in service. In no case shall the test temperature be below 250°F (121°C).

2-3.3.3 Air duct coverings shall not extend through walls or floors that are required to be firestopped or required to have a fire resistance rating.

Exception: Where such coverings meet the requirements of 3-4.6.4.

2-3.3.4 Air duct linings shall be interrupted at fire dampers to prevent interference with the operation of devices.

2-3.3.5 Air duct coverings shall not be installed so as to conceal or prevent the use of any service opening.

2-3.3.6 Pipe insulation and coverings shall meet the requirements of 2-3.3.1 and 2-3.3.2 where installed in ducts, plenums, or concealed spaces used as part of the air distribution system.

2-3.4 Air Duct Access and Inspection.

2-3.4.1 A service opening shall be provided in air ducts adjacent to each fire damper, smoke damper, and smoke detector. The opening shall be large enough to permit maintenance and resetting of the device.

Access doors for fire dampers shall be located so that the spring catch and fusible links are accessible for purposes of inspection, resetting or repair. Where the size of the duct permits, the minimum size access door shall be 18 in. x 16 in. (457 mm x 406 mm). For dampers that are too large for an ordinary person's arms to reach from outside the duct to reset the damper and replace the fusible link, the minimum size for the access door shall be increased to 24 in. x 16 in. (610 mm x 406 mm) to allow the entrance of an individual.

Access doors shall be located as close as practicable to fire dampers and smoke dampers. If feasible, the underside of the duct shall be used rather than a side door.

Whenever spring-loaded dampers require the use of two arms (two persons, if necessary) for re-setting, the access doors (one on each side of the partition, if necessary) shall be of sufficient size to allow two arms to enter the duct. Also refer to Section 27-343 of the Building Code.

2-3.4.2 Service openings shall be identified with letters having a minimum height of one-half in. (12.7 mm) to indicate the location of the fire protection device(s) within.

2-3.4.3 Horizontal air ducts and plenums shall be provided with service openings (see 2-3.4.1) to facilitate the removal of accumulations of dust and combustible materials. Service openings shall be located at approximately 20 ft. (6.095 m) intervals along the air duct and at the base of each vertical riser.

Exception No. 1: Removable air outlet or air inlet devices of adequate size shall be permitted in lieu of service openings.

Exception No. 2: Service openings shall not be required in supply ducts where the supply air has previously passed through an air filter, an air cleaner, or a water spray.

Exception No. 3: Service openings shall not be required where all the following conditions exist:

(a) *The occupancy has no process producing combustible material such as dust, lint, or greasy vapors. Such occupancies include banks, office buildings, churches, hotels, and health care facilities (but not kitchens, laundries, and manufacturing portions of such facilities).*

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(b) The air inlets are at least 7 ft. (2.135 m) above the floor or are protected by corrosion-resistant metal screens of at least 14 mesh (0.07 in.) (1.8 mm) that are installed at the inlets so that they cannot draw papers, refuse, or other combustible solids into the return air duct.

(c) The minimum design velocity in the return duct for the particular occupancy is 1000 ft./min. (5.080 m/s).

2-3.4.4 Inspection windows shall be permitted in air ducts provided they are glazed with wired glass. However, service openings shall be provided as required in 2-3.4.1.

2-3.4.5 Openings in walls or ceilings shall be provided so that service openings in air ducts are accessible for maintenance and inspection needs.

2-3.4.6 Where a service opening is necessary in an air duct located above the ceiling of a floor/roof-ceiling assembly that has been tested and assigned a fire resistance rating in accordance with RS 5-2, access shall be provided in the ceiling and shall be designed and installed so that it does not reduce the fire resistance rating of the assembly.

2-3.5 Air Duct Integrity.

2-3.5.1 Air ducts shall be located where they are not subject to damage or rupture, or they shall be protected to maintain their integrity.

2-3.5.2 Where an air duct is located outdoors, the air duct, together with its covering or lining, shall be protected from harmful elements.

2-3.5.3 Air Duct at Heat Sources. - Where electrical, fossil fuel, or solar energy collection heat sources are installed in air ducts, the installation shall avoid the creation of a fire hazard. Air ducts rated as Class 1 in accordance with UL 181/96, *Standard for Safety Factory-Made Air Ducts and Air Connectors*, air duct coverings, and linings shall be interrupted at the immediate area of operation of such heat sources in order to meet the clearances specified as a condition of the equipment listing.

Exception No. 1: Appliances listed for zero clearance from combustibles where installed in accordance with the conditions of their listings.

Exception No. 2: Insulation specifically suitable for the maximum temperature that reasonably can be anticipated on the duct surface shall be permitted to be installed at the immediate area of operation of such appliances.

2-3.6 Air Outlets.

2-3.6.1 General. - Air supplied to any space shall not contain flammable vapors, flyings, or dust in quantities and concentrations that would introduce a hazardous condition.

2-3.6.2 Construction of Air Outlets. - Air outlets shall be constructed of noncombustible material or a material that has a maximum smoke developed index/rating of 50 and a maximum flame spread index/rating of 25.

2-3.6.3 Location of Air Outlets.

(a) Air outlets shall be located at least 3 in. (76 mm) above the floor.

Exception: Where provisions have been made to prevent dirt and dust accumulations from entering the system.

(b) Where located less than 7 ft. (2.135 m) above the floor, outlet openings shall be protected by a grille or screen having openings through which a one-half in. (12.7 mm) sphere cannot pass.

(c) Grilles may be located in floors provided they are installed so that they may be removed for cleaning purposes and provided they are constructed as follows:

(1) Grilles up to 3 square feet (0.2787 m²) in gross area shall be designed to support a concentrated live load of 250 lb. (1112N) on any 4 square inches (2580 mm²) of surface.

(2) Grilles over 3 square feet (0.2787 m²) in gross area shall be designed to support the same loads as the floor in the area where used.

(3) If located where they may be walked upon, the opening in grilles shall reject a one-half inch (12.7 mm) sphere.

2-3.7 Air Inlets (Return or Exhaust or Return and Exhaust).

2-3.7.1 General. - Air shall not be recirculated from any space in which flammable vapors, flyings, or dust is present in quantities and concentrations that would introduce a hazardous condition into the return air system.

2-3.7.2 Construction of Air Inlets. - Air inlets shall be constructed of noncombustible material or a material that has a maximum flame spread index/rating of 25 and a maximum smoke developed index/rating of 50.

2-3.7.3 Location of Air Inlets.

(a) Air inlets shall be located at least 3 in. (76 mm) above the floor.

Exception: Where provisions have been made to prevent dirt and dust accumulations from entering the system.

(b) Where located less than 7 ft (2.135 m) above the floor, inlet openings shall be protected by a grill or screens having openings through which a one-half in. (12.7 mm) sphere cannot pass.

(c) Grilles may be located in floors provided they are installed so that they may be removed for cleaning purposes and provided they are constructed as follows:

(1) Grilles up to 3 square feet (0.2787 m²) in gross area shall be designed to support a concentrated live load of 250 lb. (1112 N) on any 4 square inches (2580 mm²) of surface.

(2) Grilles over 3 square feet (0.2787 m²) in gross area shall be designed to support the same loads as the floor in the area where used.

(3) If located where they may be walked upon, the opening in grilles shall reject a one-half inch (12.7 mm) sphere.

2-3.8 Fire Dampers. - Approved fire dampers shall be provided as required in Chapter 3 and installed in conformance with the conditions of their listings.

2-3.9 Smoke Dampers.

2-3.9.1 Approved smoke dampers shall be provided as required in Chapter 3 and installed in conformance with the conditions of their listings.

Reference Standard 13

2-3.9.2 Smoke dampers shall be installed in systems with a capacity greater than 15,000 cfm (7079 L/s) to isolate the air-handling equipment, including filters, from the remainder of the system in order to restrict the circulation of smoke.

Exception No. 1: Where the air-handling unit is located on the floor that it serves and serves only that floor.

Exception No. 2: Where the air-handling unit is located on the roof and serves only the floor immediately below the roof.

Exception No. 3: Existing buildings using only Class 1 filters shall be exempt from this subdivision provided the control system is arranged to shut down the fresh air intake, return air, and exhaust air dampers, and fan shutdown and smoke detection are provided in accordance with Section 4-4.

2-3.10 Plenums.

2-3.10.1 Ceiling Cavity Plenum. - The space between the top of the finished ceiling and the underside of the floor or roof above shall be permitted to be used to supply air to, or return or exhaust air from, or return and exhaust air from the occupied area provided that the following conditions are met:

(a) All materials exposed to the airflow shall be noncombustible or limited combustible and have a maximum smoke developed index/rating of 50.

Exception No. 1: The following materials shall be permitted in the ceiling cavity plenum where listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 5 ft. (1.525 m) or less when tested in accordance with the specified test method:

(a) Electrical wires and cables - Electrical wires and cables shall be installed in accordance with the NYC Electrical Code.

(b) Pneumatic tubing for control systems - UL 1820/94, Standard for Safety Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics Only.

(c) Optical-fiber cables - Optical-fiber cables shall be installed in accordance with the NYC Electrical Code.

(d) Optical-fiber cable raceway Optical-fiber cable raceway shall be installed in accordance with the NYC Electrical Code.

(e) Fire alarm cables - Fire alarm cables shall be red, type FPLP, and be installed in accordance with Reference Standards RS 17-3, RS 17-3A, RS 17-3B, and RS 17-3C, and be tested and listed in accordance with the requirements of UL 1424/90, UL 910/95 and the City of New York, and shall be marked with the company name, type FPLP, size (AWG), minimum temperature rating 150°C (UL), Also Classified NYC CERT Fire Alarm Cable.

Exception No. 2: Smoke detectors.

Exception No. 3: Loudspeakers, loudspeaker assemblies, and their accessories shall be permitted in the ceiling cavity plenum where listed as having a maximum peak

optical density of 0.5 or less, an average optical density of 0.15 or less, and a peak heat release rate of 100 kW or less when tested in accordance with UL 2043/92, Standard for Safety Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.

(b) The integrity of the firestopping for penetrations shall be maintained.

(c) Light diffusers, other than those made of metal or glass, used in air-handling light fixtures shall be listed and marked "Fixture Light Diffusers for Air-Handling Fixtures."

(d) The temperature of air delivered to these plenums shall not exceed 250°F (121°C).

(e) Materials used in the construction of a ceiling plenum shall be suitable for continuous exposure to the temperature and humidity conditions of the environmental air in the plenum.

(f) Where the plenum is a part of a floor-ceiling or roof-ceiling assembly that has been tested or investigated and assigned a fire resistance rating of 1 hour or more, the assembly shall meet the requirements of 3-3.3.

(g) All portions of the ceiling cavity plenum shall be designed to withstand the maximum air pressure differential that may be developed.

2-3.10.2 Duct Distribution Plenum. - A duct enclosure used for the multiple distribution or gathering of ducts or connectors shall be constructed of materials and methods specified in 2-3.1.

2-3.10.3 Apparatus Casing Plenum. - A fabricated plenum and apparatus casing shall be permitted to be used for supply, return, or exhaust air service and shall be constructed of materials and methods specified in 2-3.1, and in accordance with the following:

(a) The casing and plenum construction standards, as per RS 14-22.

(b) Paragraph 2-3.3 for all air duct coverings, duct lining acoustical liner/cells, and miscellaneous materials.

2-3.10.4 Air-Handling Unit Room Plenum.

(a) Individual rooms containing an air-handling unit(s) gather return air from various sources and combine the return air within the room for returning to the air-handling unit. Duct covering, duct lining, acoustical liner/cells, and miscellaneous materials shall comply with 2-3.3.

(b) Air-handling unit room plenums shall not be used for storage or occupied other than during equipment servicing.

2-3.10.5 Raised Floor Plenum. - The space between the top of the finished floor and the underside of a raised floor shall be permitted to be used to supply air to, or return exhaust air from, or return and exhaust air from the occupied area, provided that the following conditions are met:

(a) All materials exposed to the airflow shall be noncombustible or limited combustible and shall have a maximum smoke developed index/rating of 50.

Reference Standard 13

Exception No. 1: The following materials shall be permitted in the raised floor plenum where listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 5 ft. (1.525 m) or less when tested in accordance with the specified test method:

(a) *Electrical wires and cables - Electrical wires and cables shall be installed in accordance with the NYC Electrical Code.*

(b) *Pneumatic tubing for control systems - UL 1820/94, Standard for Safety Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics Only.*

(c) *Optical-fiber cables - Optical-fiber cables shall be installed in accordance with the NYC Electrical Code.*

(d) *Optical-fiber cable raceway - Optical-fiber cable raceway shall be installed in accordance with the NYC Electrical Code.*

(e) *Fire alarm cables - Fire alarm cables shall be red, type FPLP, and be installed in accordance with Reference Standards RS 17-3, RS 17-3A, RS 17-3B, and RS 17-3C, and tested and listed in accordance with the requirements of UL 1424/90, UL 910/95 and the City of New York, and shall be marked with the company name, type FPLP, size (AWG), minimum temperature rating 150°C (UL), Also Classified NYC CERT Fire Alarm Cable.*

Exception No. 2: Raised floors, intermachine cables, electrical wires, listed plenum optical-fiber cable raceways, and optical-fiber cables in computer/data processing rooms where these rooms are designed and installed in accordance with NFPA 75/95, Standard for the Protection of Electronic Computer/Data Processing Equipment.

Exception No. 3: Smoke detectors.

(b) The integrity of the firestopping for penetrations shall be maintained.

(c) The temperature of air delivered to these plenums shall not exceed 250°F (121°C).

(d) Materials used in the construction of a raised floor plenum shall be suitable for continuous exposure to the temperature and humidity conditions of the environmental air in the plenum.

2-3.11 Corridor Air Systems.

2-3.11.1 Egress Corridors. - Except in fully sprinklered office buildings, public corridors shall not be used as a portion of direct supply, return, or exhaust air system serving adjoining areas. Air transfer because of pressure differential in health care occupancies from corridors is permitted. An air transfer opening(s) shall not be permitted in walls or in doors separating egress corridors from adjoining areas.

Exception No. 1: Toilet rooms, bathrooms, shower rooms, sink closets, and similar auxiliary spaces opening directly onto the egress corridor.

Exception No. 2: Where door clearances do not exceed those specified for fire doors in RS 5-8, air transfer caused by pressure differentials shall be permitted.

Exception No. 3: Use of egress corridors as part of an engineered smoke-control system.

Exception No. 4: In detention and correctional occupancies with corridor separations of open construction (e.g., grating doors or grating partitions).

Exception No. 5: In existing buildings classified in Occupancy Group J-1 ventilation may be provided in accordance with Section 27-777.2(a) of the Administrative Code.

Exception No. 6: In institutions as classified in article 10 of subchapter 3 of the Administrative Code provided the system(s) serving the corridor have smoke detectors located as required in Section 4-4.1 of this Reference Standard that will shut down fans upon activation.

2-3.11.2 Exits. - Exit passageways, stairs, ramps, and other exits shall not be used as a part of a supply, return, or exhaust air system serving other areas of the building.

2-3.12 Smoke Control. - Where a smoke-control or exhaust system is required, it shall conform to the requirements of the building code.

CHAPTER 3 - INTEGRATION OF A VENTILATION AND AIR CONDITIONING SYSTEM(S) WITH BUILDING CONSTRUCTION

3-1 Air-Handling Equipment Rooms.

3-1.1 General. - Air-handling equipment rooms generally fall into three categories:

(a) Those used as air plenums (usually return air);

(b) Those with air ducts that open directly into a shaft; and

(c) Other air-handling unit rooms.

3-1.2 Air-Handling Equipment Rooms Used as Plenum Space. - Air-handling unit rooms used as plenums for supply or return air shall comply with 2-3.10.4.

3-1.3 Air-Handling Equipment Rooms that Have Air Ducts that Open Directly into a Shaft. Air-handling equipment rooms, including the protection of openings, shall be separated from shafts by construction having a fire resistance rating not less than that required for the shaft by 3-3.4.

Exception: Fire-resistant separation shall not be required for air-handling equipment rooms that are enclosed by construction having a fire resistance rating not less than that required for the shaft.

3-1.4 Other Spaces Housing Air-Handling Units. - Other spaces housing air-handling units shall meet the requirements of the building code, [of the authority having jurisdiction]

3-2 Building Construction.

3-2.1 Air Duct Clearance. - The clearance from metal air ducts to assemblies constructed of combustible materials, including plaster on wood lath, shall be not less than one-half in. (12.7 mm), or the combustible material shall be protected with minimum one-quarter in. (6.4 mm) firestopping material as per the Building Code. The integrity of the firestopping and smokestopping shall be maintained.

Exception: This clearance shall not apply to systems used solely for ventilation, air cooling, or air conditioning without heating.

Reference Standard 13

3-2.2 Structural Members. - The installation of air ducts, including the hangers, shall not reduce the fire resistance rating of structural members.

3-2.3 Where the installation of the hangers for the components of an air duct system penetrates an existing ceiling of a fire-resistive floor/roof-ceiling assembly and necessitates removal of a portion of that ceiling, the replacement material shall be identical to or approved as equivalent to that which was removed.

Exception: As an alternative to repairing the existing ceiling, a new ceiling shall be permitted to be installed below the air duct system, provided the fire resistance rating of the floor/roof-ceiling design is not reduced.

3-3 Penetrations - Protection of Openings. - For examples of the application of the penetration protection requirements, see Figure 3-3.

3-3.1 Fire-Rated Walls and Partitions.

3-3.1.1[*] Approved fire dampers shall be provided where air ducts penetrate or terminate at openings in walls or partitions required to have a fire resistance rating pursuant to Section 27-343 of the Administrative Code. In addition, approved fire dampers shall be provided in outdoor intake openings in accordance with Section 2-2.1.3. (See Figure 3-3).

Exception: Fire dampers shall not be required where other openings through the wall are not required to be protected.

3-3.1.2 Approved fire dampers shall be provided in all air transfer openings in partitions required to have a fire resistance rating and in which other openings are required to be protected.

3-3.2 Floors Required to Have a Fire Resistance Rating. - Where air ducts extend through only one floor and serve only two adjacent stories, the air ducts shall be enclosed (see 3-3.4.1) or fire dampers shall be installed at each point where the floor is penetrated

Exception: Air ducts serving air conditioning terminal devices on the floor above, provided a fire test conducted in accordance with RS 5-2, determines that the fire resistance rating of the floor is maintained.

3-3.3 Floor/Roof - Ceiling Assemblies Having a Fire Resistance Rating. - Where air ducts and openings for air ducts are used in a floor/roof-ceiling assembly required to have a fire resistance rating, all the materials and the construction of the assembly, including the air duct materials and the size and protection of the openings, shall conform with the design of the fire-resistive assembly, as tested in accordance with RS 5-2. (Where dampers are required, see 3-4.4.)

3-3.4 Shafts.

3-3.4.1 Enclosure of Ducts. - (a) Air ducts that pass through the floors of buildings requiring the protection of vertical openings shall be enclosed with partitions or walls constructed of materials as permitted by the Building Code, section 27-344.

Exception: Where an air duct penetrates only one floor and the air duct contains a fire damper located where the duct penetrates the floor, an air duct enclosure shall not be required.

(b) Ducts passing through two or more floors, or through a floor and a roof, and having a cross-sectional area of more than 2 square feet (0.1858 m²) shall be encased in shafts of noncombustible construction having a minimum 2-hour fire resistance rating. Where the cross-sectional area is 2 square feet (0.1858 m²) or less, such ducts may be fire protected with construction having a minimum fire resistance rating of 1 hour placed as close as possible to the duct in lieu of a shaft, with the space between the duct and the floor construction filled solidly with inert noncombustible material for the full depth of the floor construction. Exceptions and qualifications are as follows:

(1) The encasing of ducts shall not be required for ducts which are cut off from the main portion of the duct by approved fire dampers.

(2) Ducts which are located in one story and have all duct openings extending through a floor to the story next above or below may in lieu of such fire resistive enclosure be provided with approved fire dampers at each such point where the floor is pierced.

(3) Two or more ducts serving separate floors shall not be encased in the same fire resistive enclosure unless approved fire dampers are installed where each branch is taken from such encased ducts.

(4) A branch duct having a cross-sectional area of less than 20 square inches (12900 mm²) which passes through one floor only and pierces the floor at one point only to supply air conditioning units in one story only is not required to be encased. Where a branch serves connectors which pierce the floor at more than one point, the portion of the duct below the floor shall be encased with not less than one-half inch (12.7 mm) of noncombustible insulating material such as metal lath and plaster or shall be enclosed with noncombustible material such as by locating above a noncombustible ceiling.

3-3.4.2 A fire-resistive enclosure used as an air duct shall conform with 3-3.4.1 and 2-3.1. Gypsum board systems shall be constructed in accordance with RS 5-1A or RS 5-1B, and the corners of such systems shall be constructed in accordance with details approved by the Board of Standards and Appeals under Calendar Number 354-76-SM or equivalent.

3-3.4.3 Shafts that constitute air ducts or that enclose air ducts used for the movement of environmental air shall not enclose:

(a) Exhaust ducts used for the removal of smoke and grease-laden vapors from cooking equipment;

(b) Ducts used for the removal of flammable vapors;

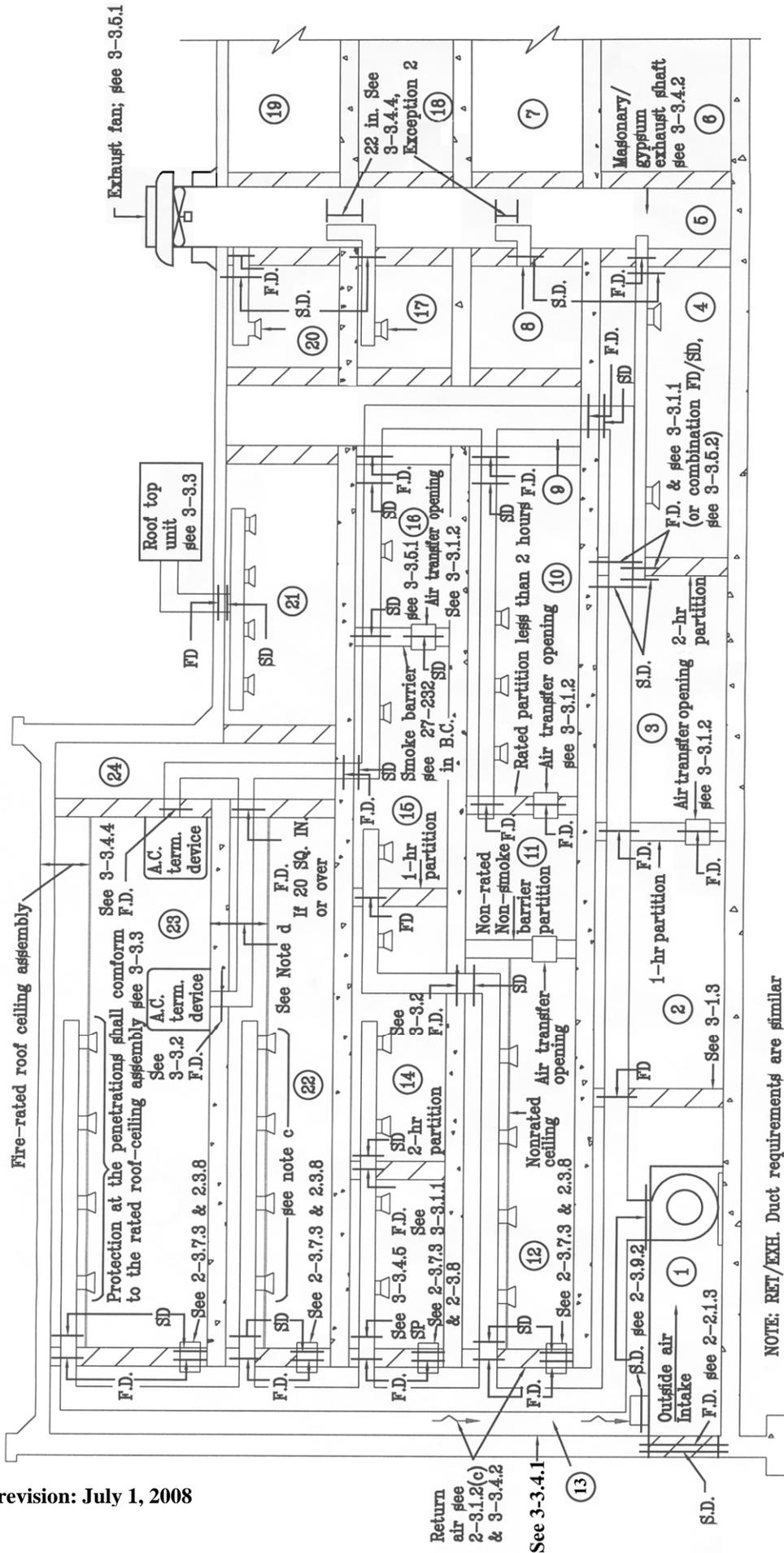
(c) Ducts used for moving, conveying, or transporting stock, vapor or dust;

(d) Ducts used for the removal of nonflammable corrosive fumes and vapors;

(e) Refuse and linen chutes; or

(f) Piping.

Exception: Noncombustible piping conveying water or other nonhazardous or nontoxic materials.



revision: July 1, 2008

Return air see 2-3.1.2(c) & 3-3.4.2

See 3-3.4.1

NOTE: RET/EXH. Duct requirements are similar

S.D.=Smoke Damper, see notes a, e
 F.D.=fire Damper, see note b
 (1)(2)(3)=Space identification

B.C.=Building Code

- a: SD or combination FD/SD in 2-hr. floor or partition, see 3-3.4 & 3-3.5.1
- b: See §27-343 in B.C.
- c: Protection at these penetrations shall conform to the rated floor ceiling assembly see 3-3.3
- d: Fire-Rated Floor Ceiling Assembly
- e: Not req'd for the exceptions to 3-3.5.1

Figure 3-3 Application of Penetration requirements

3-3.4.4 Fire dampers shall be installed at each direct or ducted opening into or out of enclosures required by 3-3.4.1.

Exception No. 1: Where an air duct system serving only one story is used only for exhaust of air to the outside and is contained within its own dedicated shaft.

Exception No. 2: Where branch ducts connect to enclosed exhaust risers meeting the requirements of 3-3.4.1 or 3-3.4.2 in which the airflow moves upward and steel subducts at least 22 in. (559 mm) in length are carried up inside the riser for each inlet and the riser is appropriately sized to accommodate the flow restriction created by the subduct. (See Figure 3-3)

Exception No. 3: Where such openings are provided for ducts serving air terminal units and the ducts or duct connectors meet all of the following conditions (See Figure 3-3):

(a) They have a cross-sectional area of less than 20 sq. in. (12900 mm²);

(b) They meet the requirements specified in 2-3.1;

(c) They serve air terminal units which directly abut the shaft enclosure or have continuous architectural enclosures constructed the same as the air terminal unit; and

(d) They meet the requirements of 3-4.6.4.

3-3.5 Location of Smoke Dampers.

3-3.5.1 Smoke dampers shall be installed at or adjacent to the point where air ducts pass through required smoke barriers, partitions adjacent to spaces leading from elevators to a street or to the exterior of a building, and any construction required to have a rating of 2 hrs. or more, but in no case shall a smoke damper be installed more than 2 ft. (610 mm) from the barrier or after the first air duct inlet or outlet, whichever is closer to the smoke barrier.

Exception No. 1: Smoke dampers shall not be required on air systems other than where necessary for the proper function of that system where the system is designed specifically to:

(a) Function as an engineered smoke-control system, including the provision of continuous air movement with the air-handling system; or

(b) Provide air to other areas of the building during a fire emergency; or

(c) Provide pressure differentials during a fire emergency.

Exception No. 2: Smoke dampers shall not be required to be located within a prescribed distance of a fire rated enclosure where isolation smoke dampers are used in air-handling equipment. (See 2-3.9.2)

Exception No. 3: Buildings classified in Occupancy Group J-2.

Exception No. 4: Smoke dampers shall not be required in ducts where the air continues to move and the air-handling system installed is arranged to prevent recirculation of exhaust or return air under fire emergency conditions.

3-3.5.2 Where penetration of a smoke barrier is required to be provided with a fire damper, a combination fire and smoke damper equipped and arranged to be both smoke responsive and heat responsive shall be permitted.

3-3.5.3 The above requirements are applicable to new buildings and existing buildings where new fire rated partitions are erected or where existing ducts are being modified or reconfigured in such a way as to require the installation of smoke and/or fire dampers.

3-4 Fire Dampers, Smoke Dampers, and Ceiling Dampers.

3-4.1 Fire dampers used for the protection of openings in walls, partitions, or floors with fire resistance ratings of less than 3 hours shall have a one and one-half-hour fire protection rating in accordance with UL 555/99, *Standard for Safety Fire Dampers*.

3-4.2 Fire dampers used for the protection of openings in walls, partitions, or floors having a fire resistance rating of 3 hours or more shall have a 3-hour fire protection rating in accordance with UL 555/99, *Standard for Safety Fire Dampers*.

3-4.3 Smoke dampers used for the protection of openings in smoke barriers or in engineered smoke-control systems shall be classified in accordance with UL 555S/99, *Standard for Safety Leakage Rated Dampers for Use in Smoke Control Systems*.

3-4.4 Ceiling dampers or other methods of protecting openings in rated floor/roof-ceiling assemblies shall comply with the construction details of the tested floor/roof-ceiling assembly or with listed ceiling air diffusers, or with listed ceiling dampers. Ceiling dampers shall be tested in accordance with UL 555C/96, *Standard for Safety Ceiling Dampers*.

3-4.5 Damper Closure.

3-4.5.1 All fire dampers and ceiling dampers shall close automatically, and they shall remain closed upon the operation of a listed fusible link or other approved heat-actuated device located where readily affected by an abnormal rise of temperature in the air duct.

3-4.5.2 Fusible links shall have a temperature rating approximately 50°F (28°C) above the maximum temperature that normally is encountered when the system is in operation or shut down, but not less than 160°F (71°C).

Exception: Where combination fire/smoke dampers are located within air ducts that are part of an engineered smoke-control system, fusible links or other approved heat-responsive devices shall have a temperature rating approximately 50°F (28°C) above the maximum smoke-control system designed operating temperature, but shall not exceed the UL 555S/99, Standard for Safety Leakage Rated Dampers for Use in Smoke Control Systems degradation test temperature rating of the combination fire/smoke damper or a maximum of 350°F (177°C).

3-4.5.3 A provision for remote opening of combination fire and smoke dampers, where necessary for smoke removal, shall be permitted. Such dampers shall have provisions that allow them to reclose automatically upon reaching the damper's maximum degradation test temperature in accordance with UL 555S/99, *Standard for Safety Leakage Rated Dampers for Use in Smoke Control Systems*.

3-4.5.4 Dampers shall close against the maximum calculated airflow of that portion of the air duct system in which they are installed. Fire dampers shall be tested in accordance with UL 555/99, *Standard for Safety Fire*

Reference Standard 13

Dampers. Smoke dampers shall be tested in accordance with UL 555S/99, *Standard for Safety Leakage Rated Dampers for Use in Smoke Control Systems.*

Exception: Where provisions for fan or airflow shutdown are provided.

3-4.6 Installation. (See 2-3.4 for access)

3-4.6.1 The locations and mounting arrangement of all fire dampers, smoke dampers, ceiling dampers, and fire protection means of a similar nature required by this standard shall be shown on the mechanical plans pursuant to section 27-157(c) or 27-162 of the Building Code.

3-4.6.2 Fire dampers (including their sleeves), smoke dampers, and ceiling dampers shall be installed in accordance with the conditions of their listings and the manufacturer's installation instructions.

3-4.6.3 The thickness of sleeves for fire dampers shall not be less than that associated with the conditions of rating required by Section 3-4.

Exception: Where UL 555/99, *Standard for Safety Fire Dampers*, permits sleeve thickness to be the same as that of the duct gage, such thickness shall not be less than that specified in Table 3-4.6.3.

Table 3-4.6.3 Minimum Sleeve Thickness Permitted in Accordance with UL 555/99
(See 3-4.6.3 Exception.)

Air Duct Diameter Or Maximum Width		Minimum Sleeve Thickness	
(in.)	(mm.)	(in.)	(mm.)
12 or less	305	0.018	26
13-30	330-762	0.024	24
31-54	181-1370	0.030	22
55-84	1395-2135	0.036	20
85 or more	2160	0.047	18

3-4.6.4 Patching, Filling, and Repairing. Where air ducts pass through walls, floors or partitions required to have a fire resistance rating and where fire dampers are not required, the opening in the construction around the air duct shall not exceed a 1-in. (25.4 mm) average clearance on all sides and shall be firestopped in accordance with the Building Code.

Exception: Where fire dampers are installed, proper clearance for expansion shall be maintained. (See 3-4.6.)

CHAPTER 4 - CONTROLS

4-1 Wiring. The installation of electrical wiring and equipment associated with the operation and control of air conditioning and ventilating systems shall be in accordance with the Electrical Code of the City of New York.

4-2 Manual Control. Each air distribution system shall be provided with not less than one manually operable means to stop the operation of the supply, return, and exhaust fans(s) in an emergency. The means of manual operation shall be located at an approved location.

4-2.1 Any building classified in Occupancy Group E, 75 feet (22.840 m) or more in height, and any existing office building 100 feet (30.450 m) or more in height where a system serves floors other

than the floor on which the equipment is located, in addition to the controls required by this chapter, shall be provided with:

(a) Manual controls for operating individually each air supply and each exhaust or return fan in the system located as follows:

(1) At the Fire Command Station, (or in a mechanical control center in existing buildings only), and

(2) In the room containing the affected air handling fans.

(b) Manual controls for operating individually or in groups each remote control reversible fire shutter, when such shutters are provided in accordance with the provisions of Section 27-972 of the Administrative Code, or each smoke damper provided in accordance with the provisions of Section 27-777.1(b) of the Administrative Code, shall be located at the Fire Command Station, (or in a mechanical control center in existing buildings only).

4-2.2 Manual Restart of Fans After Reset of an Automatic Fire Detecting Device or Fire Alarm System. Fans or fan systems which have been automatically shut down on activation of an automatic fire detecting device or fire alarm system shall be arranged and equipped not to automatically restart when either the automatic fire detecting device or fire alarm system is reset. The manual means of restarting the fans or fan system shall function independently from the manual resetting of either the automatic fire detecting device or fire alarm system.

4-3 Smoke Dampers.

4-3.1 Smoke dampers shall be activated by an automatic smoke and/or alarm initiating device. Smoke dampers that are part of an engineered smoke control system shall be capable of being positioned manually from a command station. Such positioning devices shall be provided, for supply and return/exhaust dampers, grouped by floor and by type (i.e. supply or return/ exhaust). Damper switch positions shall indicate whether the related dampers are commanded to be either open or closed.

Smoke damper positioning switches shall be located at the Fire Command Station, or in a mechanical control center in buildings without a Fire Command Station.

Refer to Section 27-777.1(b) of the Building Code for additional requirements.

4-3.2 Smoke dampers installed to isolate the air-handling system in accordance with 2-3.9.2 shall be arranged to close automatically when the system is not in operation.

4-3.3 Smoke dampers installed in smoke barriers shall be permitted to remain open during fan shutdown, provided their associated controlling damper actuators and smoke detectors remain operational.

4-4 Smoke Detection for Automatic Control.

4-4.1 Location. Smoke detectors listed for use in air distribution systems shall be located:

(a) Downstream of the air filters and ahead of any branch connections in air supply systems having a capacity greater than 2000 cfm (944 L/s).

(b) At each story in buildings classified in Occupancy Group E, 75 ft. (22.838 m) or more in height, and in existing office buildings 100 ft. (30.450 m) or more in

Reference Standard 13

height prior to the connection to a return air shaft in air return systems having a capacity greater than 15,000 cfm (7080 L/s) and serving more than one story except that in an existing office building 100 feet (30.450 m) or more in height where compliance would cause practical difficulty or undue hardship, the Commissioner may approve other locations for such devices fulfilling the intent of the requirement.

(c) In the return air stream, prior to exhausting from the building and prior to any recirculation or fresh air inlet connection in air return systems having a capacity equal to or greater than 15,000 cfm (7080 L/s) arranged to either automatically exhaust the smoke laden return air or to stop the fan.

Exception No. 1: Return system smoke detectors shall not be required where the entire space served by the air distribution system is protected by a system of area smoke detectors.

Exception No. 2: Fan units whose sole function is to remove air from the inside of the building to the outside of the building.

Exception No. 3: Systems meeting the criteria for Exceptions Nos. 1 or 2 in Section 2-3.9.2.

Exception No. 4: Smoke detectors provided in accordance with (b) above shall fulfill the requirement of (c) above.

4-4.2 Function. Smoke detectors provided as required by 4-4.1 shall automatically stop their respective fan(s) upon detecting the presence of smoke.

Exception: Where the return air fan is functioning as part of an engineered smoke-control system and a different mode is required.

4-4.3 Installation.

4-4.3.1 In addition to the requirements of 4-4.2, where an approved protective signaling system is installed in a building, the smoke detectors required by the provisions of Sections 4-3 and 4-4 shall be connected to the protective signaling system in accordance with the requirements of the Building Code, so that the activation of any air distribution system smoke detector causes a supervisory signal to be indicated at a constantly attended location or causes an alarm signal.

4-4.3.2 Where smoke detectors required by Section 4-4 are installed in a building not equipped with an approved protective signaling system as specified by 4-4.3.1:

(a) The smoke detector activation required by Section 4-4 shall cause a visual and an audible signal in a normally occupied area; and

(b) Smoke detector trouble conditions shall be indicated visually or audibly in a normally occupied area and shall be identified as air duct detector trouble.

4-4.3.3 Smoke detectors powered separately from the signaling system for the sole function of stopping fans shall not require standby power.

4-4.3.4 When any building or floor is provided with an air system utilizing recirculated air and is protected by an automatic sprinkler system or an automatic fire alarm system, provision shall be made to automatically stop the fans serving the affected area when the sprinkler system or fire alarm system operates. Where both sprinkler systems and fire alarm systems are installed in the area,

it shall be required to have only one of these systems arranged to stop the fans.

Exception No. 1: Activation of a manual pull station shall not be required to automatically stop the fans.

Exception No. 2: Systems having a capacity of 2,000 cfm or less or serving not more than one floor.

****DOB 5-4-02; 17-87 BCR; Local Law 16-1984*

***REFERENCE STANDARD RS 13-2**

Exhaust Systems for Cooking Spaces

1. Construction-Exhaust systems for cooking spaces shall be separate systems that may exhaust a number or such spaces. The ductwork shall be constructed as required by Reference Standard RS 13-1, with the following modifications:

(a) Ducts shall be of galvanized steel and the minimum gage shall be as follows:

(1) In all buildings other than those classified as residential occupancy, a minimum of no. 16 galvanized sheet gage shall be used.

(2) In residential occupancies other than one- and two-family dwellings a minimum of no. 18 galvanized sheet gage shall be used.

(3) In one- and two-family dwellings the gages shall be as required in Reference Standard RS 13-4 for supply ductwork.

(b) Where branch ductwork is to be used to exhaust vapors from dishwashers, pot sinks, or other similar equipment of a commercial type from which moisture is emitted, copper or aluminum of the minimum gages and weights required in Reference Standard RS 13-1, or other equivalent moisture and corrosion resistant metals, shall be used. Such ductwork shall be installed so that condensate cannot leak from it.

(c) Sub-ducts, as described in Reference Standard RS 13-1, shall not be permitted in lieu of fire dampers.

**506-77 BCR*

****REFERENCE STANDARD RS 13-3**

ANSI/NFPA 96-1984 Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment, as Modified.

Modifications. - The provisions of ANSI/NFPA 96-1984 shall be subject to the following modifications. The chapter, section and paragraph numbers are from that standard.

Amend Section 1-3.1 as follows:

1-3.1 Commercial cooking equipment used in processes producing smoke or grease-laden vapors and fumes such as from ranges, deep fat fryers, grills, broilers, candy kettles, cruller furnaces and ovens shall be equipped with an independent exhaust system complying with the following:

(a) A hood complying with the requirements of Chapter 2, and

(b) A duct system complying with the requirements

Reference Standard 13

of Chapter 3, and

(c) Grease removal devices complying with the requirements of Chapter 4, and

(d) Fire extinguishing equipment complying with the requirements of Chapter 7.

Add Section 1-3.1.1:

1-3.1.1 Where restaurant type equipment is installed and is used only for warming, where no frying or grilling is done, and where no grease-laden vapors or fumes can be generated, compliance with reference standard RS 13-6 shall not be required, and the ductwork may be constructed as required in reference standard RS 13-2. Where restaurant type equipment is installed for periodic cooking use, for other than commercial only, in community rooms of multiple dwellings, firehouses and other low hazard occupancies, determined by the commissioner, automatic fire extinguishing systems shall not be required and the ductwork may be constructed as required in reference standard RS 13-1.

Replace Section 1-3.3 with the following:

1-3.3 Permits in accordance with Section C26-109.1 of the Administrative (Building) Code shall be required for the alteration, replacement, or relocation of any exhaust or extinguishing system or part thereof, or cooking equipment.

1-3.3.1 Upon the issuance of such permit, the Contractor shall install the system as described on the applications and plans, examined and approved by the Department of Buildings.

1-3.3.2 Upon completion, the work shall be subject to a performance test conducted by the installer and witnessed by a representative from the Fire Department for the purpose of determining the performance of the installed system in accordance with Section C19-165.3 of the Administrative Code.

1-3.3.3 Any discrepancies between the system as installed and the approved plans which prevents certification, shall be brought to the attention of the Department of Buildings and the Applicant of Record.

Add the following sections:

3-2.9.1.1 If the building is less than 4 stories in height and of construction classification II-C, II-D and II-E, the enclosure wall shall have a fire resistance rating of not less than one-hour.

3-2.9.4 Branch ducts from other equipment in the same kitchen area, for which hoods and filters are not required, or from registers exhausting the kitchen space in general, may be connected to the main hood exhaust duct if the following requirements are complied with:

(a) A fusible link fire damper of the same gage as the hood exhaust duct shall be added at the point of connection of the branch duct to the hood exhaust duct.

(b) If the branch connection is made to the portion of the ductwork that will contain the fire extinguishing medium, then the fire dampers required in above shall be arranged to close automatically upon the operation of the fire extinguishing system.

(c) The branch connection shall be made in either the top or sides of the main duct in a manner to prevent grease from flowing into the branch duct.

(d) The branch ducts shall be constructed of steel, aluminum, or copper of the gages and weights required in reference standard RS 13-1; and they shall be insulated with one inch of magnesia or other material having equivalent insulative and fire resistance qualities.

(e) All registers in these branches shall have fusible link actuated dampers.

(f) When branch ductwork is to be used to exhaust vapors from dishwashers, pot sinks, or from other equipment of a commercial type from which moisture is emitted, copper, aluminum, or other corrosion resistant metals of the minimum gages and weights required in reference standard RS 13-1 shall be used. Such ductwork shall be installed so that condensate cannot leak from it.

3-2.9.5 All hoods in a single room or kitchen and/or all hoods in separate rooms may be connected to the same system, provided all of the hoods are part of the same facilities and are located on the same floor and under the control of one owner or tenant.

3-2.10 Insulation

3-2.10.1 A minimum insulation covering of two-inches of magnesium or calcium silicate block, attached with galvanized steel wire or construction equivalent in insulating and fire resistance qualities, shall be applied to all ducts inside of the building. The insulation shall be applied up to the outer face of the discharge from the building and shall also be applied to the housing of the exhaust fan when it is located inside of the building. Care shall be taken to insure that the insulation extends through the walls and roofs to separate the ducts from the building construction. Masonry or concrete ducts shall not require insulation.

Replace section 3-3.1 with the following:

3-3.1 Materials - Ducts shall be constructed in accordance with Table 15-4 of Section C26-1501.8 for low temperature chimneys.

Amend the following section:

3-5.1 In all buildings more than one (1) story in height and in one-story buildings where the roof or roof-ceiling assembly is required to have a fire resistance rating, the ducts shall be enclosed in a continuous enclosure extending from the ceiling above the hood, through any vertical spaces passing through other floors, or through the roof so as to maintain the integrity of the fire separations required by the applicable building code provisions. Horizontal ducts passing through fire walls or partitions shall be protected by an enclosure or thimble extending at least equal to the width of the duct. Where passing over exit corridors, the protection shall be for the entire length of the duct within the corridor. The enclosure shall conform to the following:

Amend the following section:

4-1.2.1.2 Grease filters shall be accepted for use with

Reference Standard 13

commercial cooking equipment.

Add the following section:

4-1.2.1.3 Grease filters shall comply with UL 1046-1979. Standard for Grease Filters for Exhaust Ducts.

5-1.3 Flexible connectors at fans shall be made of non-combustible material that has a mineral base and that cannot be penetrated by grease.

7-1.3 Approved fixed pipe extinguishing equipment, in addition to approved filters or other approved means of grease extraction, shall be provided where any of the following conditions occur:

(a) Where the discharge of the exhaust system is located in a wall below the top floor of a building, such discharges shall be permitted only where the wall containing the discharge is constructed with an outer surface of non-combustible material, having a fire resistance rating of one-hour or more and where this non-combustible material extends 8 ft. horizontally on either side of the opening and projects to a height of 40 ft. above the opening.

(b) Where the length of duct from the most remote hood in the system to the discharge from the building is more than 20 feet.

(c) Where the total exhaust air from all hoods served by the system is more than 3,000 cfm.

7-2.2 The following minimum requirements shall apply for the particular type of extinguishing system:

7-2.2.1 Where steam is used: A continuous source of steam supply of at least 15 psi shall be provided. The pipe sizes of the main branch shall be at least 1 1/2 inch in diameter and to the last stream jet or nozzle shall be at least 3/4 inch in diameter. Such nozzles shall be standard 1/2 inch open sprinkler heads or equivalent in spray pattern and delivery. Nozzles shall be located throughout the entire run of duct up to the flue or riser duct and the confining damper shall be located at this point. The piping within the hood and ductwork shall be a minimum of ANSI Schedule 40 steel with 125 psi standard cast iron screwed fittings. The piping shall be arranged and/or dipped to remove all condensate on both sides of the automatic and manual control valves. A shut-off valve that is sealed open shall be located in the branch line before the control valve.

7-2.2.2 Where a fine water spray is used: All pipe and valve sizes shall conform to provisions for the installation of sprinklers in reference standard RS 17-5. The minimum static pressure at the highest nozzle shall be at least 30 psig. Also, 1/2 inch open wide pattern nozzles shall be installed throughout.

7-2.2.3 Where carbon dioxide is used: At least one 50 lb. cylinder of carbon dioxide shall be provided for each installation up to 400 cu. ft. of hood and duct volume. For every additional 400 cu. ft. or portion thereof, an additional 50 lb. cylinder shall be installed. A confining damper shall be installed in the duct not less than 25 feet down stream from the last uptake or inlet from the hood or equipment into the duct.

7-2.2.4 Where listed pre-engineered dry chemical and liquid agent is used: All pipe and fittings shall conform

to the manufacturer's specifications and limitations as approved by a national recognized testing laboratory, and approved by the Board of Standards and Appeals. Confining dampers shall be installed in the duct work, as per section 3-2.9.4, only for branch ducts connected to the main grease exhaust duct and shall be automatically operated either by means of mechanical fusible links or electric thermostats connected and/or wired to the extinguishing system to effect simultaneous operation. Exhaust fans shall not be inter-wired with the extinguishing system. They shall continue operation during and after the extinguishing system's discharge.

Amend the following section:

7-3.1.2 Fixed pipe extinguishing systems in a single hazard fire section (see Section 1-2) shall be arranged for simultaneous automatic operation upon actuation of any one of the systems.

Exception: When the fixed pipe extinguishing system is an automatic sprinkler system.

7-3.2 Except as otherwise provided, the following additional requirements shall apply for all extinguishing systems:

7-3.2.1 Manual controls or manual releases shall be accessibly located whenever practical on a path of egress from the protected area and at least 10 feet but not more than 35 feet from the hood and shall be sealed closed with a light wire seal or easy break-glass control. Manual controls shall be of quick-opening lever type and shall be operated by a chain or insulated handle.

7-3.2.2 Signs shall be affixed to all hand valves, manual control, or manual releases indicating the purpose of these devices and designating their proper operating position for manual operation.

7-3.2.3 The duct system and any deep frying units shall be provided with an adequate number of nozzles to effectively extinguish a fire. As minimum requirements, one nozzle shall be installed at each inlet to the duct and one at each side of any required confining damper. The nozzle on the downstream side of any required confining damper shall have a capacity of at least 10 percent of the total capacity of the system. The distance between other nozzles throughout the duct shall not exceed 10 feet on centers, except as provided in 7-2.2.4, and thermal detecting units shall be located at all duct inlets.

7-3.2.4 The automatic releasing equipment and heat detecting units shall be approved.

7-3.3 Clear, concise and complete operating and cleaning instructions covering all components of the exhaust system shall be permanently posted outside the main entrance or other suitable entrance to the kitchen; and, a schematic drawing or sketch at least 8 1/2 inches by 11 inches in size, showing the origin, run and terminus of the grease duct shall be similarly posted.

Replace Sections 7-4.1 and 7-4.2 with the following:

7-4.1 Complete drawings of the system installation to include the hood(s), exhaust duct(s), and appliances along with the interface of the fire extinguishing system

Reference Standard 13

detectors, piping, nozzles, fuel shut-off devices, agent storage container(s), and manual actuation device(s) shall be submitted in accordance with the requirements of sub-article 116.0 of this Code.

7-4.2 Installation of systems shall be made only by persons properly trained and qualified to install the specific system being provided. The installer shall certify to the Fire Commissioner that the installation is in complete agreement with the terms of the listing and the manufacturer's instruction and approved design, and that the manufacturer has qualified the installer.

Replace Section 8-2.1 with the following:

8-2.1 An inspection, test and servicing of the automatic valve operation and the fire extinguishing system by properly trained and qualified persons, on behalf of the owner, shall be made at least every six months. A record of such tests shall be kept on the premises and shall be available for inspection by the Commissioner and the Fire Commissioner.

Add the following Section: 8-4 Filters

8-4.1 Filters shall be serviced and replaced regularly by qualified employees of the owner or by a cleaning agency. A record indicating the name of the person or firm doing the servicing and the dates when filters were cleaned or replaced shall be available for inspection by the Commissioner. They shall be cleaned or replaced as frequently as necessary, but at least every three months and no exhaust system shall be operated while cooking is being carried on without the filters installed in place.

****814-85 BCR; 695-84 BCR**

*REFERENCE STANDARD RS 13-4

ANSI/NFiPA- 90 B 1996, as modified—Standard for the Installation of Warm Air Heating and Air Conditioning Systems.

The provisions of ANSI/NFiPA No. 90 B-96 together with the modifications thereto shall constitute Reference Standards RS 13-4 and RS 14-1.

The appendices to ANSI/NFiPA No. 90 B-96 are not part of this Reference Standard. These are for informational purposes only.

Wherever reference is made to the "National Electrical Code" it shall be changed to read "Electrical Code of the City of New York."

The New York State Energy Conservation Construction Code also regulates the design and construction of heating, ventilating, and air conditioning systems in New York City.

STANDARD FOR THE INSTALLATION OF WARM AIR HEATING AND AIR CONDITIONING SYSTEMS

ANSI/NFiPA No. 90 B-1996, AS MODIFIED

Delete the NOTICE.

Delete asterisks from all section numbers having them.

Material in [brackets] is to be deleted.

Underlined material is new.

*** denotes unchanged text.

Section numbers are from ANSI/NFiPA No. 90 B-1996.

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Chapter 1 General

1-1 Scope. This standard shall apply to all systems for the movement of environmental air in structures that are otherwise exempted by Section 27-777(b) of the Administrative Code, or whose heating systems are subject to Section 27-812 of the Administrative Code.

[(a) Serve one- or two-family dwellings; or (b) Serve spaces not exceeding 25,000 ft³ (708 m³) in volume in any occupancy.]

Exception: Buildings of combustible construction over three stories in height shall be in accordance with NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.]

1-1.1 The provisions of this standard are not intended to be applied retroactively. Where the system is being altered, extended, or renovated, the requirements of Article 4 of Subchapter 1 of Chapter 1 of Title 27 of the Administrative Code shall govern the applicability of this standard.

1-3 Definitions.

Accepted - Means "Accepted" by the Materials and Equipment Acceptance Division of the Department of Buildings.

NOTE: The MEA Division is the "authority having jurisdiction" in use of materials, assemblies, forms, methods of construction, and service equipment subject to the acceptance requirements of Building Code Sections 27-131 and 27-135.

Air Filter. [A device used to reduce or remove air-borne solids from heating, ventilating, and air conditioning systems.]

(a) A Class 1 air filter is one which, when clean, does not contribute fuel when attacked by flame, and emits

Reference Standard 13

only negligible amounts of smoke when tested in accordance with RS 13-15.

(b) A Class 2 air filter is one which, when clean, burns moderately when attacked by flame or emits moderate amounts of smoke or both when tested in accordance with RS 13-15.

Approved. [Acceptable to the authority having jurisdiction.] See subchapter 2 of the Building Code for definition.

Authority Having Jurisdiction. [The organization, office, or individual responsible for approving equipment, an installation, or a procedure.] The Commissioner of the Department of Buildings or his designee.

* * *

Listed - Equipment, materials or services included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states either that the equipment, material or service meets identified standards or has been tested and found suitable for use in a specified purpose.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Noncombustible Material. [A material that, in the form in which it is used and under the conditions anticipated, cannot ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat. When tested in accordance with ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C, materials that successfully pass the test shall be considered noncombustible.] See subchapter 2 of the Building Code for definition.

* * *

[Should. Indicates a recommendation or that which is advised but not required.]

* * *

Chapter 2 System Components

* * *

2-1.1.1 Supply ducts shall be:

- (a) Class 0 or Class 1 rigid or flexible air ducts tested in accordance with UL 181/96, *Standard for Safety Factory-Made Air Ducts and Air Connectors*; or
(b) Of sheet metal having a nominal thickness as shown in Table 2-1.1.1.

Exception No. 1: Supply ducts that are completely encased in not less than 2 in. (51 mm) of concrete in a floor slab shall not be required to meet the requirements of 2-1.1.1, except within 2 ft (0.61 m) of the furnace supply plenum and within 2 ft (0.61 m) of a vertical connection to a riser or register.

Exception No. 2: Supply ducts for a separate air cooling system, not interconnected to any warm air heating system, serving a single-family dwelling shall not be required to meet the requirements of 2-1.1.1, provided that they are not closer than 2 ft (0.61 m) to

any furnace or its supply plenum, boiler, or other heat-producing appliances and that they comply with 2-2.1.1, 2-2.1.3, 2-2.2, 2-2.3, and 2-2.4 as specified for return ducts.

Exception No. 3: Vibration isolation connectors in duct systems shall be made of approved flame-retardant fabric or shall consist of sleeve joints with packing of approved noncombustible material. The fabric shall not exceed 10 in. (254 mm) in length in the direction of airflow.

Exception No. 4: A Class 0 or Class 1 rigid or flexible air duct shall not be used as a vertical air duct that is more than two stories in height.

Exception No. 5: A Class 0 or Class 1 rigid or flexible air duct shall not be used in an air duct containing air at a temperature in excess of 250°F (121°C).

2-1.1.2 Supply ducts shall be installed in conformance with:

- (a) The conditions of their listing;
(b) RS 14-22 [SMACNA *Fibrous Glass Duct Construction Standards*];
(c) SMACNA *HVAC Duct Construction Standards — Metal and Flexible*;
(d) SMACNA *Installation Standards for Residential Heating and Air Conditioning Systems*.]

2-1.2 Air Connectors. Air connectors are limited-use, flexible air ducts that shall not be required to conform to the requirements for air ducts, provided they conform to the following provisions:

- (a) Air connectors shall conform to the requirements for Class 0 or Class 1 connectors when tested in accordance with UL 181/96, *Standard for Safety Factory-Made Air Ducts and Air Connectors*.
(b) Class 0 or Class 1 air connectors shall not be used in ducts containing air at temperatures in excess of 250°F (121°C).
(c) An air connector run shall not exceed 14 ft (4.3 m) in length.
(d) Air connectors shall not pass through any wall, partition, or enclosure of a vertical shaft that is required to have a fire resistance rating of 1 hour or more.
(e) Air connectors shall not pass through floors.
(f) Air connectors shall be installed in conformance with the conditions of their approval.

* * *

2-3.1.2 Duct coverings and linings shall not flame, glow, smolder, or smoke when tested in accordance with ASTM C 411/97, *Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation*, at the temperature to which it is exposed in service. In no case shall the test temperature be below 250°F (121°C).

* * *

2-3.2 Joints. Joints and seams shall be fastened securely and made substantially airtight. Slip joints shall have a lap of at least 1 in. (25.4 mm) and shall be fastened individually (see Figure 2-3.2). Tape shall be permitted to be used for sealing joints but, where exposed to the air in the system, it shall not be more combustible than fabric complying with [NFPA 701,

Reference Standard 13

Standard Methods of Fire Tests for Flame-Resistant Textiles and Films] RS 7-3.

Closure systems for use with rigid air ducts tested in accordance with UL 181/96, *Standard for Safety Factory-Made Air Ducts and Air Connectors*, shall have been tested and listed in accordance with UL 181A/94, *Standard for Safety Closure Systems for Use with Rigid Air Ducts and Air Connectors*, and used in conformance with the conditions of the listing.

2-3.5.1 Registers shall be constructed of metal or shall conform with the following:

(a) Registers shall be made of a material classified as 94 HB when tested as described in UL 94/96, *Standard for Safety Test for Flammability of Plastic Materials for Parts in Devices and Appliances*.

(b) Floor registers shall resist, without structural failure, a 200-lb (90.7-kg) concentrated load on a 2-in. (51-mm) diameter disc applied to the most critical area of the exposed face of the register. For this test, the register shall be at a temperature not less than 165°F (74°C) and shall be supported in accordance with the manufacturer's instructions.

2-3.5.3 Fittings connecting the registers to the duct system shall be constructed of metal or material that complies with the requirements of Class 0, Class 1, or Class 2 ducts in UL 181/96, *Standard for Safety Factory-Made Air Ducts and Air Connectors*.

4-1.1.3 Construction.

(a) Where the warm air supply is from a warm air furnace, heating panels shall be enclosed on all sides with material that is wholly noncombustible or that possesses a flame spread classification of not over 25 as determined in accordance with [NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*] RS 5-5. This enclosing material shall be attached securely to the building structure; joints and seams shall be substantially airtight. Braces and hangers inside the chamber shall be noncombustible.

(b) Where the warm air supply is from a steam or hot water heat exchanger, heating panels shall either comply with 4-1.1.3(a) or shall be enclosed on all sides with material not more flammable than 1-in. (25.4-mm) (nominal) wood boards. This enclosing material shall be attached securely to the building structure; joints and seams shall be substantially airtight. No single vertical heating panel shall serve more than one story.

4-1.3.1 Air filters shall have either a Class 1 or Class 2 rating in accordance with [UL 900, *Standard for Safety Air Filter Units*, 1994] RS 13-15.

4-1.3.3 Liquid adhesive coatings used on filters shall have a flash point not less than 325°F (163°C) in accordance with [ASTM D 93, *Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester*] RS 14-13.

4-1.3.4 All air filters shall be kept free of excess dust and combustible material. Unit filters shall be renewed or cleaned when the resistance to airflow has increased to two times the original resistance or when the resistance has reached a value of recommended replacement by the manufacturer. A permanently installed draft gauge shall be provided for this purpose. Where the filters are of the automatic liquid adhesive type, sludge shall be removed from the liquid adhesive reservoir regularly.

4-1.4 Air-Cooling Equipment.

Mechanical refrigeration used with air duct systems shall be installed in accordance with [ANSI/ASHRAE 15, *Safety Code for Mechanical Refrigeration*] RS 13-6.

4-2 Electric Wiring and Equipment.

Electric wiring and equipment shall be adequate for safe operation and shall be installed in accordance with [NFPA 70, *National Electrical Code*®] the New York City Electrical Code. In addition, a disconnecting means shall be installed within sight and easy reach in the ungrounded leads of each power circuit to electrically operated components that are in unprotected locations and in other locations not readily accessible for service.

4-3.2 Fan Control for Stoker-Fired Furnaces.

Where a warm air furnace equipped with a fan to circulate the air is stoker-fired, it also shall be equipped with an automatic overrun control to start the fan when the air in the furnace bonnet or at the beginning of the main supply duct at a point not affected by radiated heat reaches a temperature not higher than 200°F (93°C) after the stoker and fan (in its normal operation) have been shut down as a result of a satisfied thermostat. If a manual disconnect is installed in the air circulating fan electrical circuit, it shall be installed to deenergize both the fan and the stoker simultaneously. Solid fuel may be used only as permitted by Local Law 93/85.

4-3.4 Thermostatically Controlled, Hand-Fired, Solid-Fuel Burning Furnaces.

Hand-fired, solid-fuel burning furnaces on which the furnace draft is controlled by a thermostat shall be equipped with the following:

(a) A fail-safe 250°F (121°C) limit control installed not more than 10 in. (254 mm) above the top surface of the heat exchanger in a supply plenum that extends at least 12 in. (305 mm) above the top surface of the heat exchanger; and

(b) A barometric draft control operated by draft intensity and permanently set to limit the draft to a maximum intensity of 0.13 in. (32.4 Pa) of water gauge. A fail-safe limit control is a limit control that automatically checks the furnace in the event of power failure or shutoff or that automatically checks the furnace when a temperature of 250°F (121°C) is reached, whether or not power is available.

(c) Solid fuel may be used only as permitted by Local Law 93/85.

4-3.5 Air-Circulating Fan Controls.

Reference Standard 13

Where a hand-fired, solid-fuel burning furnace is equipped with a fan to circulate the air, it shall be equipped with fan controls as required for stoker-fired furnaces by 4-3.2. Solid fuel may be used only as permitted by Local Law 93/85.

* * *

Chapter 5 Referenced Publications – Delete Appendix B - Delete

**DOB 5-4-02; 723-72 BCR*

**REFERENCE STANDARD RS 13-5

ANSI/NFPA 91-1973-Standard for the installation of blower and exhaust systems for dust, stock, and vapor removal or conveying.

***913-82 BCR*

***REFERENCE STANDARD RS 13-6

New material is underlined.

Material in [brackets] is existing text to be deleted

**** Indicates where unchanged text appears in the*

Referenced National Standards

Material in bold text or italicized text is as appears in the Referenced National Standards

Modifications – The provisions of ANSI/ASHRAE 15-2001 shall be subject to the following modifications. The section and subsection numbers are from the standard.

* * *

2. SCOPE

Subsection 2.2 is amended to read as follows:

2.2 This standard applies

(a) to the design, construction, test, installation, operation, and inspection of mechanical and absorption refrigeration systems including heat pump systems used in stationary applications,

(b) to modifications including replacement of parts or components if they are not identical in function and similar capacity, and

(c) to substitutions of refrigerant having a different designation,] except that substitutions made to a system lawfully installed prior to and maintained and operated since April 27, 2005, shall not trigger the requirement that the system's "Air supply and exhaust ducts to the machinery room shall serve no other area". (§ 8.11.4) for the following replacement refrigerants:

(i) Refrigerants having a safety classification of Group A1.

(ii) R123, provided that the architect or engineer demonstrates to the satisfaction of the Commissioner that:

a. Providing such air supply and exhaust ducts represents a hardship (such as but not limited to existing machinery rooms located in a cellar (sub-basement) with their supply and exhaust ducts serving other areas, etc); and

b. The proposed alternative provides an equivalent level of safety.

3. DEFINITIONS

Add or amend the following definitions:

accepted: acceptable to the Commissioner of the Department of Buildings of the City of New York.

authority having jurisdiction: the Commissioner of the Department of Buildings of the City of New York.

listed: equipment or material[s] included in a list published by an organization [approved, nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner] acceptable to the Commissioner of the Department of Buildings of the City of New York. Listed equipment and materials shall comply with all provisions of the reference standard.

lobby: [a waiting room or large hallway serving as a waiting room.] Refer to §27-370 of the New York City Building Code for the meaning of lobby.

premises: [a tract of land and the buildings thereon.] As defined in Article 2, Subchapter 2 of the New York City Building Code.

tenant: a person or organization having the legal right to occupy a premises.]

The title of Section 4. is amended as follows:

4. BUILDING OCCUPANCY CLASSIFICATION

Subsections 4.1.1 through 4.1.6 are amended as follows:

The occupancy group classifications of building occupancies shall be those defined in the NYC Building Code as follows:

4.1.1 Institutional occupancy [is a premise or that portion of a premise from which, because they are disabled, debilitated, or confined, occupants cannot readily leave without the assistance of others. Institutional occupancies include, among others, hospitals, nursing homes, asylums, and spaces containing locked cells.] shall include Occupancy Groups H-1 and H-2.

4.1.2 Public assembly occupancy [is a premise or that portion of a premise where large numbers of people congregate and from which occupants cannot quickly vacate the space. Public assembly occupancies include, among others, auditoriums, ballrooms, classrooms, passenger depots, restaurants, and theaters.] shall include Occupancy Groups F-1, F-2, F-3, F-4, and G.

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4.1.3 Residential occupancy [is a premise or that portion of a premise that provides the occupants with complete independent living facilities including permanent provisions for living, sleeping, eating, cooking, and sanitation. Residential occupancies include, among others, dormitories, hotels, multi-unit apartments, and private residences.]— shall include Occupancy Groups J-1, J-2 and J-3.

4.1.4 Commercial occupancy [is a premise or that portion of a premise where people transact business, receive personal service, or purchase food and other goods. Commercial occupancies include, among others, office and professional buildings, markets (but not large mercantile occupancies), and work or storage areas that do not qualify as industrial occupancies.]— shall include Occupancy Groups C and E, except retail stores having an occupant load of more than 100 persons on any floor other than the street floor.

4.1.5 Large mercantile occupancy [is a premise or that portion of a premise where more than 100 persons congregate on levels above or below street level to purchase personal merchandise.]— retail stores having an occupant load of more than 100 persons on any floor other than the street floor.

4.1.6 Industrial occupancy [is a premise or that portion of a premise that is not open to the public, where access by authorized persons is controlled, and that is used to manufacture, process, or store goods such as chemicals, food, ice, meat, or petroleum.] — shall include Occupancy Groups A, B-1, B-2, D-1 and D-2.

5. REFRIGERATING SYSTEM CLASSIFICATION

Subsection 5.3 is amended as follows:

5.3 Changing Refrigerant. A change in the type of refrigerant in a system shall not be made without the notification of the authority having jurisdiction, the user, and due observation of safety requirements. The refrigerant being considered shall be evaluated for suitability_[1] by the architect or engineer. Such evaluation may include, but not be limited to an evaluation of:

- (a) The effects of the substituted refrigerant on materials in the system;
- (b) The possibility of overloading the liquid receiver which shall not be more than 80 percent full of liquid;
- (c) The liability of exceeding motor horsepower, design working pressure, or any other element that would violate any of the provisions of this reference standard;
- (d) The proper size of refrigerant controls;
- (e) The effect of the operation and setting of safety devices;
- (f) The possible hazards created by mixture of the original and the substituted refrigerant;
- (g) The effect of the classification of the refrigerant as provided.

7. RESTRICTIONS ON REFRIGERANT USE

Subsection 7.2 Exception is amended as follows:
Exception:

[(a) Listed equipment containing not more than 6.6 lb. (3 kg) of refrigerant, regardless of its refrigerant safety classification, is exempt from 7.2 provided the equipment is installed in accordance with the listing and with the manufacturer's installation instructions.

(b) Listed equipment for use in laboratories with more than 100 ft² (9.3 m²) of space per person, regardless of the refrigerant safety classification, is exempt from 7.2 provided that the equipment is installed in accordance with the listing and the manufacturer's installation instructions.] Use of a Group A3 or Group B3 refrigerant is prohibited. However, in an Industrial Occupancy, a Group A3 or Group B3 refrigerant may be used in high or low probability systems only when approved by the Commissioner and the Fire Commissioner. Such use will be approved only if the applicant can demonstrate to the satisfaction of the Commissioner and the Fire Commissioner that the use of the refrigerant does not represent a substantial risk to life, limb, health or property.

7.2.2 Condition 3, Exception: is amended as follows:

Exception: The minimum floor area shall not apply where the space is provided with egress directly to the outdoors or into [approved] building exits_[1] meeting the requirements of the New York City Building Code.

Subsection 7.5.2 is amended to read as follows:

7.5.2 Applications for Human Comfort. Group A2, A3, B1, B2, and B3 refrigerants shall not be used in high-probability systems for human comfort.

Exceptions:

(1) [Subsection] 7.5.2 does not apply to sealed absorption and unit systems having refrigerant quantities less than or equal to those indicated in Table 2.

(2) [Subsection] 7.5.2 does not apply to industrial occupancies.

8. INSTALLATION RESTRICTIONS

Subsection 8.2 is amended to read as follows:

8.2 Guards. Moving machinery shall be guarded in accordance with [approved safety standards.³] UL 1995³.

Subsection 8.6 is amended to read as follows:

8.6 Gas Fuel Equipment. Gas fuel devices and equipment used with refrigerating systems shall be installed in accordance with [approved safety standards and the requirements of the authority having jurisdiction] this code.

Subsection 8.7 is amended to read as follows:

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8.7 Air Duct Installation. Air duct systems of air conditioning equipment for human comfort using mechanical refrigeration shall be installed in accordance with [approved safety standards, the requirements of the authority having jurisdiction] this code and the requirements of 8.11.7.

Subsection 8.8 is amended to read as follows:

8.8 Refrigerant Parts in Air Duct. Joints and all refrigerant-containing parts of a refrigerating system located in an air duct carrying conditioned air to and from an occupied space shall be constructed to withstand a temperature of [700°F (371.1°C)] 1,000°F (537.8°C) without leakage into the airstream.

Subsection 8.10.1 is amended to read as follows:

8.10.1 Refrigerant piping crossing an open space that affords passageway in any building shall not be less than [7.25 ft (2.2m)] 7.50 ft (2.3 m) above the floor unless the piping is located against the ceiling of such space and is permitted by the authority having jurisdiction.

Subsection 8.10.3(c) is deleted as follows:

8.10.3 Refrigerant piping shall not penetrate floors, ceilings, or roofs.

Exceptions:

[(c) Penetrations connecting adjacent floors served by the refrigeration system.]

Subsection 8.11.2 is amended to read as follows:

8.11.2 Each refrigerating machinery room shall have a tight-fitting door or doors opening outward, self-closing if they open into the building, and adequate in number to ensure freedom for persons to escape in an emergency. With the exception of access doors and panels in air ducts and air handling units conforming to 8.11.7, there shall be no openings that will permit passage of escaping refrigerant to other parts of the building. All doors of the machinery room shall be provided with the appropriate diamond hazard identification sign in accordance with National Fire Protection Standard No. 704 - 2001.

Subsection 8.11.2.1 first paragraph is amended to read as follows:

8.11.2.1 Each refrigerating machinery room shall contain a detector, located in an area where refrigerant from a leak will concentrate, that actuates an alarm and mechanical ventilation in accordance with 8.11.4 at a value not greater than the corresponding TLV-TWA (or toxicity measure consistent therewith), or 20% of the LFL, whichever is smaller. The alarm shall annunciate visual and audible alarms inside the refrigerating machinery room and outside each entrance to the refrigerating machinery room. The alarms required in this section shall be of the manual reset type with the reset located inside the refrigerating machinery room.

Add the new subsection as follows:

8.11.2.2 Remote Controls. A clearly identified switch of the break-glass type shall provide off-only control of the compressors in the machinery room. A second clearly identified switch of the break-glass type shall provide on-only control of the machinery room ventilation fans. Such switches shall be located outside each entrance to the machinery room and as close to the entrance as practicable, except that when an outside location is impracticable, such switches may be located immediately inside the machinery room provided such location is accessible at all times.

Subsection 8.11.4 is amended to read as follows:

8.11.4 Mechanical ventilation referred to in 8.11.3 shall be by one or more power-driven fans capable of exhausting air from the machinery room at least in the amount given in the formula in 8.11.5. To obtain a reduced airflow for normal ventilation, multiple fans or multispeed fans shall be used. Provision shall be made for inlet air to replace that being exhausted. Openings for inlet air shall be positioned to avoid recirculation. Air supply and exhaust ducts to the machinery room shall serve no other area. The discharge of the air shall be to the outdoors in such a manner as not to cause a nuisance or danger. Also, the discharge of the fans shall not be within ten feet (3 m) of any air intake, building opening, fire escape or exterior stair. Exhaust registers or outlets capable of exhausting the amount required by subsection 8.11.5 shall be located near the floor unless a lighter than air refrigerant is used. When a lighter than air refrigerant is used, the exhaust registers or outlets shall be located near the ceiling. Emergency remote controls for the mechanical means of ventilation shall be provided and located outside the machinery room.

Subsection 8.12 (b) is amended to read as follows:

8.12(b) Doors communicating with the building shall be [approved] accepted, self-closing, tight-fitting fire doors, and shall be provided with the appropriate diamond hazard identification sign in accordance with National Fire Protection Association Standard Number 704 of 2001.

Subsection 8.12 (i) is amended by read as follows:

(i) Remote control of the mechanical equipment in the refrigerating machinery room shall be provided immediately outside the machinery room door solely for the purpose of shutting down the equipment in an emergency. Ventilation fans shall be on a separate electrical circuit and have a control switch located immediately outside the machinery room door.

A clearly identified switch of the break-glass type shall provide off-only control of the compressors in the machinery room. A second clearly identified switch of the break-glass type shall provide on-only control of the machinery room ventilation fans. Such switches shall be located outside

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each entrance to the machinery room and as close to the entrance as practicable, except that when an outside location is impracticable, such switches may be located immediately inside the machinery room provided such location is accessible at all times.

New subsection 8.15 is added as follows:

8.15 All insulation including finishes, coverings, vapor barriers, and adhesives used with refrigeration systems shall meet the requirements of section 27-811 of the New York City Building Code.

9. DESIGN AND CONSTRUCTION OF EQUIPMENT AND SYSTEMS

Subsection 9.3.1.1(a) is amended to read as follows:

9.3.1.1 (a) listed either individually or as part of an assembly [an approved,] a nationally recognized testing laboratory or

Subsection 9.4.1 is amended to read as follows:

9.4.1 Refrigerating systems shall be protected by a pressure-relief device or other [approved] recognized means to safely relieve pressure due to fire or other abnormal conditions.

Subsection 9.7.2.3 is amended to read as follows:

9.7.2.3 Pressure vessels of 10 ft³ (0.285 m³) or more internal gross volume shall use [a single] one or more rupture member(s) or dual pressure-relief valves when discharging to the atmosphere. Dual pressure-relief valves shall be installed with a three-way valve to allow testing or repair. When dual relief valves are used, each valve must meet the requirements of subsection 9.7.5.

Exception: A single relief valve is permitted on pressure vessels of 10 ft³ (0.285 m³) or more internal gross volume when all of the following conditions are met:

- (a) the relief valves are located on the low side of the system, and
- (b) the vessel is provided with shutoff valves designed to allow pumpdown of the refrigerant charge of the pressure vessel, and
- (c) other pressure vessels in the system are separately protected in accordance with subsection 9.7.2.

Subsection 9.7.2.4 is to be deleted in its entirety as follows:

9.7.2.4 One or more relief valves shall be used on pressure vessels of 10 ft³ (0.285 m³) or more internal gross volume if:
(a) the relief valves are located on the lowside of the system,
(b) shut-off valves are installed to isolate the vessels from the rest of the refrigerating system, and
(c) the system is designed to allow pumpdown of the refrigerant charge of the pressure vessel.]

Subsection 9.7.8 is deleted in its entirety and amended to read as follows:

9.7.8 Pressure-relief devices and fusible plugs on any system containing a Group A3 or B3 refrigerant; or any system containing more than 6.6 lb (3 kg) of a Group A2, B1, or B2 refrigerant; and on any system containing more than 110 lb (50 kg) of a Group A1 refrigerant shall discharge to the atmosphere at a location not less than 15 ft (4.57 m) above the adjoining ground level and not less than 20 ft (6.1 m) from any window, ventilation opening, or exit in any building. The discharge shall be terminated in a manner that will prevent the discharged refrigerant from being sprayed directly on personnel in the vicinity and foreign material or debris from entering the discharge piping. Discharge piping connected to the discharge side of a fusible plug or rupture member shall have provisions to prevent plugging the pipe in the event the fusible plug or rupture member functions.]

9.7.8 Discharge of pressure relief devices and fusible plugs on all systems containing a Group A3 or B3 refrigerant or more than one pound of a Group A2, B1 or B2 refrigerant shall be to the outside of the building. On systems containing more than 100 lb (45 kg) of Group A1 refrigerant, discharge of pressure relief devices and fusible plugs shall be to outside of the building. The discharge pipe shall be at least 15 ft (4.6 m) above the adjoining grade level and not less than 20 ft (6 m) from any window, ventilation opening, or exit in any building. The discharge shall be terminated in such a manner as to prevent direct spray of discharged refrigerant on personnel in the vicinity and foreign material or debris from entering the discharge piping. Discharge of systems employing Group A2 or B2 refrigerant shall be acceptable to the Commissioner. Discharge of Group A3 or B3 refrigerant shall be acceptable to the Commissioner and the Fire Commissioner. The relief valve and fusible plug discharge piping shall not have any isolation valves or other restrictions in the line to obstruct the relief flow.

Subsection 9.9.1 is amended to read as follows:

9.9.1 When Required. Pressure-limiting devices shall be provided on all systems operating above atmospheric pressure, except that a pressure-limiting device is not required on any factory-sealed system containing less than 22 lb. (10 kg) of Group A1 refrigerant that has been listed by [an approved,] a nationally recognized testing laboratory and is so identified.

Subsection 9.10.1 is amended to read as follows:

9.10.1 Refrigerant piping, valves, fittings, and related parts having a maximum internal or external design pressure greater than 15 psig (103.4 kPa gage) shall be listed either individually or as part of an assembly or a system by [an approved,] a nationally recognized laboratory or shall comply with ASME B31.5⁶ where applicable.

Subsection 9.11.1, first paragraph is amended to read as follows:

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9.11.1 Every pressure-containing component of a refrigerating system, other than pressure vessels, piping, pressure gages, and control mechanisms, shall be listed either individually or as part of a complete refrigeration system or a sub assembly by [an approved,] a nationally recognized testing laboratory or shall be designed, constructed, and assembled to have an ultimate strength sufficient to withstand three times the design pressure for which it is rated.

Subsection 9.11.2 is amended to read as follows:

9.11.2 Liquid-level-gage glass columns shall have manual and automatic closing shut-off valves. All such glass columns shall be protected against external damage and properly supported.

Exception: Liquid-level-gage glasses of the bull's-eye type.

Subsection 9.12.5, first paragraph is amended to read as follows:

9.12.5 Systems containing [more than 110 lb (50 kg)] 100 lb (45 kg) or more of refrigerant shall have stop valves installed at the following locations:

Subsection 9.15 is amended to read as follows:

9.15 Nameplate. Each unit system and each separate condensing unit, compressor, or compressor unit sold for field assembly in a refrigerating system shall carry a nameplate marked with the manufacturer's name, nationally registered trademark or trade name, identification number, the design pressures, and the refrigerant for which it is designed. The refrigerant shall be designated by the refrigerant number (R number) as shown in Table 1. If the refrigerant is not listed in Table 1, the refrigerant shall be designated in accordance with *ANSI/ASHRAE 34*.¹ Also include the horsepower of the prime mover or compressor, and the equivalent of such horsepower in kilowatts.

11. GENERAL REQUIREMENTS

Subsection 11.2.1 is amended to read as follows:

11.2.1 Installation Identification. Each refrigerating system erected on the premises shall be provided with a legible permanent sign, securely attached and easily accessible, indicating

- (a) the name and address of the installer,
- (b) the refrigerant number and amount of refrigerant,
- (c) the lubricant identity and amount, [and]
- (d) the field test pressure applied_[,] and
- (e) the horsepower of the prime mover or compressor and the equivalent thereof in kilowatts.

Subsection 11.3 is amended to read as follows:

11.3 Charging, Withdrawal, and Disposition of Refrigerants. No service containers shall be left connected to a system except while charging or withdrawing refrigerant. Refrigerants withdrawn from refrigerating systems shall be transferred to [approved containers only] containers meeting the requirements of the Fire Department as specified in Title 27, Chapter

4, Subchapter 17 of the NYC Fire Code. Except for discharge of pressure-relief devices and fusible plugs, incidental releases due to leaks, purging of noncondensibles, draining oil and other routine operating or maintenance procedures, no refrigerant shall be discharged to the atmosphere or to locations such as a sewer, river, stream, or lake.

Subsection 11.4 is amended to read as follows:

11.4 Containers. Containers used for refrigerants withdrawn from a refrigerating system shall be as prescribed in the pertinent regulations of the Department of Transportation and shall be carefully weighed each time they are used for this purpose, and containers shall not be filled in excess of the permissible filling weight_[,] and in no case more than 75 per cent of the container capacity.

Section 11.5 is amended to read as follows:

11.5 Storing Refrigerant. The total amount of refrigerant stored in a machinery room [in all containers not provided with relief valves and piping in accordance with 9.7 shall not exceed 330 lb (150 kg).] shall not be more than twenty percent of the normal charge in the system or more than 330 lb (150 kg) in addition to the charge in the system and the refrigerant in a permanently attached receiver. Refrigerant shall be stored in [approved storage] containers_[,] meeting the requirements of the Fire Department. Additional quantities of refrigerant shall be stored in [an] a [approved] storage facility_[,] meeting the requirements of the New York City Building Code".

Exception: Recovery service containers used for storing refrigerant during periods of system maintenance or replacement may exceed 330 lb (150 kg) provided such containers, (1) are securely fixed in position, and (2) have pressure relief valves piped to the outside in conformance with this standard.

Subsection 11.7 Responsibility for Operation and Emergency Shutdown, second paragraph is amended to read as follows:

Emergency shutdown procedures, including precautions to be observed in case of a breakdown or leak, shall be displayed on a conspicuous card located as near as possible to the refrigerant compressor. These precautions shall address

- (a) instructions for shutting down the system in case of emergency;
- (b) the name, address, and day and night telephone number for obtaining service; and
- (c) the names, addresses, and telephone numbers of all corporate, local, state, and federal agencies to be contacted as required in the event of a reportable incident_[,];
- (d) Where such systems are installed in machinery rooms, the instructions shall state that, in case of emergency or refrigerant leakage, the machinery room shall be vacated promptly, the system shut down by means of the required remote controls located outside the machinery room, and the room ventilated.

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13. LISTED EQUIPMENT

Section 13 is amended to read as follows:

13. LISTED EQUIPMENT

Equipment listed by [an approved] a, nationally recognized testing laboratory and identified, as part of the listing, as being in conformance with this standard is deemed to meet the design, construction of equipment and factory test requirements sections of this standard for the refrigerants or refrigerants for which the equipment was designed.

APPENDIX E NORMATIVE REFERENCES

Normative reference Number 4. is amended as follows:

4. [ANSI/NFPA 70-1990, *National Electrical Code*, National Fire Protection Association (NFPA), Quincy, MA 02269] New York City Electrical Code.

*** *DOB 4-27-05; 913-82 BCR; Local Law 76-1972.*

*REFERENCE STANDARD RS 13-7

ANSI Z263.1/UL 207-1982 Standard for Refrigerant Containing Components and Accessories, Non Electrical.

**913-82 BCR; Local Law 80-1973*

*REFERENCE STANDARD RS 13-8

ANSI Z262.1/UL 303 - 1980 Standard for Refrigeration and Air-Conditioning Condensing and Compressor Units. Revision March 1982.

**913-82 BCR; Local Law 80-1973*

*REFERENCE STANDARD RS 13-9

ANSI B136.1/UL 353 - 1974 Limit Controls. Revision November 1976.

**913-82 BCR; Local Law 80-1973*

*REFERENCE STANDARD RS 13-10

ANSI Z226.1/UL 372 - 1975 Standard for Primary Safety Controls for Gas and Oil-Fired Appliances. Revisions September 10, 1976 and September 3, 1980.

**913-82 BCR; Local Law 80-1973*

*REFERENCE STANDARD RS 13-11A

ANSI B144.1/UL 465 - 1978 Standard for Central Cooling Air Conditioners. Revision May 1981.

**913-82 BCR; Local Law 80-1973*

**REFERENCE STANDARD RS 13-11B FIELD TEST PROCEDURES FOR LARGE

MECHANICAL LIQUID CHILLING UNITS

1.0 PURPOSE

1.1 The purpose of this procedure is to establish the basis for investigation and testing a mechanical liquid chilling unit, primarily for use with environmental applications, to determine its adequacy for public safety.

2.0 SCOPE

2.1 This procedure applies to mechanical liquid chilling packages consisting of a factory designed and fabricated assembly (not necessarily shipped as one package) of one or more compressors, condensers and liquid coolers with interconnections and appurtenances.

2.2 This procedure applies to any reciprocating, centrifugal or screw type hermetic liquid chilling package or open-drive liquid chilling package driven by an electric motor, steam turbine or other prime mover which cannot be tested in an approved independent testing laboratory. Certification of the inadequacy of existing test facilities shall be obtained in writing from the President, Air Conditioning and Refrigeration Institute and accepted by the Director, MEA Division, prior to commencement of testing.

2.3 All electrical work shall conform with the New York City Electrical Code. Electrical equipment shall be submitted to the Advisory Board of the Bureau of Gas and Electricity for approval.

3.0 REFERENCE STANDARDS

3.1 The equipment shall comply with all applicable requirements of the following standards and codes:

3.1.1 Hermetic and open-drive chilling units.

A. ANSI B9.1 Safety Code for Mechanical Refrigeration.

B. ANSI B144.1 (UL 465) Standard for Safety, Central Cooling Air Conditioners.

3.1.2 Open-drive chilling units.

A. Electric motor drive: ANSI C51.1 (NEMA Publication MG 2) Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators.

B. Steam turbine drive: NEMA Publication SM 21 Multistage Steam Turbines For Mechanical Drive Service of NEMA Publication SM 22 Single Stage Turbines for Mechanical Drive Service.

C. Gas turbine drive: ANSI B176.1 (NFIPA No. 37) Installation and Use of Stationary Combustion Engines and Gas Turbines.

D. Gas or Diesel Engine drive: ANSI B176.1 (NFIPA No. 37) Installation and Use of Stationary Combustion Engines and Gas Turbines.

3.2 Where conflicting requirements might occur between ANSI B9.1 and ANSI B144.1, the requirements of ANSI B9.1 shall govern.

3.3 Where conflicting requirements might occur between ANSI C51.1 and ANSI B144.1, the requirements of ANSI C51.1 shall govern.

3.4 For interpretive and supplemental information necessary to adapt ANSI B144.1 (UL 465) requirements to mechanical liquid chilling packages, refer to Section 6.

4.0 PROCEDURE FOR CERTIFICATION OF COMPLIANCE

4.1 An approved independent testing laboratory, hereinafter the Laboratory, shall be retained to determine

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and certify compliance to referenced standards, and to this procedure: or that a reduced requirement has been met.

4.1.1 Laboratory, as referred to herein, shall be an independent testing laboratory which has been approved by the City of New York for such work and has received an MEA laboratory acceptance number.

4.2 The Laboratory shall review the manufacturer's equipment design to determine what tests are required to meet the reference standards and this procedure.

4.2.1 The Laboratory shall review the manufacturer's test data produced during the manufacturing process and shall direct the performance of final tests in the manufacturer's facility or in the field.

4.2.2 Where tests are performed at a location remote from the manufacturer's factory, it shall be the responsibility of the Laboratory to determine that the equipment involved is adequate for subjection to the specified tests. The Laboratory shall avail itself of applicable design, inspection, and test records from the manufacturer in making this determination.

4.2.3 The Laboratory shall submit a written final test report certifying that the requirements of the referenced standards and this procedure have been met; of which, if any, requirements were not met, and why.

5.0 INSPECTION AND TESTING REQUIREMENTS AND PROCEDURES

5.1 Where testing for compliance to applicable standards or this procedure has been performed by the Laboratory in the manufacturer's facility, it shall not be necessary to repeat the test in the field, provided that the design and testing criteria were met and a report submitted.

5.2 It is not intended that equipment or components intended for subsequent installation and service be in any way damaged, deformed or destroyed as a result of tests specified in the reference standards or in this procedure. When this conflicts with a requirement of a referenced standard, a sample of an equivalent component shall be subjected to the required test and the chiller or component in question be evaluated by engineering analysis. The sample may be tested in the manufacturer's facility or elsewhere by the Laboratory.

5.2.1 Results of tests that have been performed on equipment or components of the same model and design, when of equal size or larger, are considered acceptable for use by the Laboratory in evaluation of equipment design by engineering analysis.

5.3 Any component, device, or unit that bears a U. L. label shall be considered to be in compliance with the requirements of the reference standards and of this procedure without further testing, provided that it is applied within its rating and that no modifications have been made following shipment from the manufacturer's facility.

5.4 Any components, device, or unit that bears a C.S.A. label shall be considered to be in compliance with the requirements of the referenced standards and of this procedure without further testing provided that it is applied within its rating and that no modifications have been made following shipment from the manufacturer's facility.

5.5 Any pressure vessel that bears the ASME Code U or N stamp shall be considered to be in compliance with

all applicable portions of the referenced standards and of this procedure without design review or further testing provided no modifications to the vessel have been made after shipment from the manufacturer's facility.

5.6 Any pressure vessel that bears the ASME Code UM stamp shall be considered to be in compliance with the requirements of the referenced standards and this procedure without design review or further testing provided that the Laboratory has determined that the vessel was tested in accordance with applicable standards, and that no modifications to the vessel have been made following shipment from the manufacturer's facility.

5.7 This procedure shall apply only to liquid chiller packages and components of such packages, and does not apply to auxiliary or associated system components furnished by parties other than the chiller manufacturer. The responsibility for determination that such components or devices satisfy the requirements of applicable standards and codes is not within the scope of this procedure.

5.8 It is the responsibility of the Laboratory to insure adequate safeguards for the protection of personnel from hazards associated with testing requirements.

5.9 It shall be the responsibility of the Laboratory to insure that equipment, devices, and facilities be properly protected during performance of specified tests.

6.0 INTERPRETATIONS AND SUPPLEMENTAL INFORMATION

6.1 Substitutions and Additions to UL 465, Standard for Safety, Central Cooling Air Conditioners.

6.1.1 To Section 1.1 add: Liquid chillers as described in this procedure are normally installed in systems classified as "Indirect Systems" as described in Section 4.4 of ANSI B9.1, Safety Code for Mechanical Refrigeration, where there is no direct interface between the refrigerant and the air serving the conditioned space.

6.1.2 In Section 1.3 change maximum voltage to 15,000 volts.

6.1.3 To Section 3.2 add: Where the compressor motor controller and overload protective device are not furnished by the manufacturer of the chiller, the manufacturer shall provide a specification for these components for the customer. The specification shall include information as to the required controller rating, sequencing of start, overload protection trip current and connections to the chiller control system. If a current transformer to provide a signal input circuit to the chiller control system is to be included, the specification is to include the requirements for the current transformer and its shunting device, if any.

6.1.4 To Section 8.19 thru 8.26 add: If the field-wiring enclosure of the motor or that portion of the wiring enclosure to which a field-wiring system (conduit) is to be connected can be readily removed and replaced in the field, an opening or knockout for connection of a wiring system to the motor is not required to be provided. The surface of the enclosure to which the field-wiring system is to be connected shall be of adequate size to accommodate the number and size of conduits which may be required for the installation.

6.1.5 To Section 10.24 add: Soldering lugs or pressure terminal connectors are not required to be provided by the manufacturer for connection of the field wiring to

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hermetic motor power supply terminals. Threaded studs of adequate size and length are to be used. Nuts for the studs shall be provided to adequately secure at least one terminal connector to each threaded stud.

6.1.6 To Section 11 add: Wiring to hermetic motors shall be with copper conductors only unless it can be determined that galvanic corrosion due to condensation at the terminals will not occur.

6.1.7 To Section 12 add:

A signal input circuit derived from a current transformer sensing the motor current and located in the (remote) motor controller is considered to be a National Electric Code Class 1 circuit. It shall be segregated or separate from other circuits.

B. Unless provided with insulation rated for the highest voltage involved, terminals for temperature sensors, when furnished on motors, shall be located in a separate enclosure or shall be separated by substantial barriers from the space provided for field wiring to the power supply connections on the motor.

C. Factory wiring to such sensing devices shall be protected from damage during installation of field wiring to the motor.

6.1.8 To Table 13.1 add the conductor sizes for larger current ratings from Table 250-95 of National Electric Code NFPA No. 70.

6.1.9 To Section 16 add:

A. Insulating materials used inside hermetic motors shall be compatible with the refrigerants and oil used. They shall also be compatible with each other and with other materials used within the motor.

B. Compliance with paragraph (A) is to be judged in the same manner as for materials used in hermetic motor-compressors as judged under the Standard for Sealed (Hermetic Type) Motor Compressors, UL 984.

6.1.10 To Section 23 add:

A. For hermetic motors rated 600 volts or less, the spacings inside the motor shall conform with the requirements in the Standard for Sealed (Hermetic Type) Motor-Compressors, UL 984.

B. For hermetic motors rated more than 600 volts, the spacings shall conform with paragraphs (C) thru (E) inside and outside the enclosure.

C. Except as indicated in paragraph (E), the spacing between uninsulated live parts of different polarity shall not be less than the value indicated in Table 6-1.

TABLE 6-1 MINIMUM SPACING BETWEEN UNINSULATED LIVE PARTS OF DIFFERENT POLARITY

Rating Volts	Through Space Inches	Oversurface Inches
601- 1,000	3/8	1/2
1,001- 2,000	3/4	1 3/8
2,001- 3,000	1	2
3,001- 5,000	3 1/4	4
5,001- 7,500	4	5
7,501- 12,500	5 1/4	7
12,501- 15,000	6	8

D. Except as indicated in paragraph (E), the spacing between uninsulated live parts and dead-metal parts

including the enclosure shall not be less than the value indicated in Table 6-2.

TABLE 6-2 MINIMUM SPACING BETWEEN UNINSULATED LIVE PARTS AND DEAD-METAL PARTS

Rating Volts	Through Space Inches	Oversurface Inches
601- 1,000	3/8	1/2
1,001- 2,000	3/4	1 3/8
2,001- 3,000	1	2
3,001- 5,000	2 1/2	3
5,001- 7,500	3	3 1/2
7,501- 12,500	4 3/8	5
12,501- 15,000	5	5 3/4

E. Linings or barriers of suitable insulating materials may be employed where the spacings are less than the values specified in Tables 6-1 and 6-2 provided that the linings or barriers are securely fastened in place.

F. Spacings inside hermetic type oil pump assemblies shall comply with the spacing requirements for inside hermetic motors. See paragraph (A). Spacings in non-hermetic motors shall comply with the Safety Standard for Electric Motors, NEMA Publication MG-2.

G. A signal input circuit at a low level of voltage or current to the chiller control system which is derived from a current transformer sensing the motor current and located in the (remote) motor controller is not considered to be a low-voltage circuit. The spacings on the basis of the maximum available voltage or current at the component from the signal circuit with the motor operating at rated load current assuming this is a high-voltage circuit, and as described in paragraph (I). Consideration shall also be given to the voltage and current available during starting and stalled rotor conditions.

H. The terms "low-voltage circuit" and "high-voltage circuit" are defined in UL 465, paragraph 2.2.

I. Provision shall be made for limiting the potential (voltage) in the chiller control assembly resulting from an open secondary circuit of a remote current transformer, such as described in paragraph (G) to a potential (voltage) for which the chiller control components in this circuit are acceptable.

J. The open secondary circuit may result from an open remote shunt resistor or from a disconnected or broken conductor at the connection to the chiller control circuit.

6.1.11 For Section 27.5 substitute 8.3.1 of ANSI B9.1 Safety Code for Mechanical Refrigeration.

6.1.12 For Section 27.10 substitute the following: The dial of a pressure gauge permanently connected to the high side of a refrigeration system shall be graduated up to not less than 1.2 times the design pressure of the high side of the system.

6.1.13 In Section 28.5 change maximum setting of pressure limiting device to 90% of the design pressure of the high side of the refrigeration system for positive displacement compressors and 100% of the design pressure of the high side of the refrigeration system for non-positive displacement compressors.

6.1.14 For Section 29 substitute Section 10, Pressure

Reference Standard 13

Relief Protection, of ANSI B9.1 Safety Code for Mechanical Refrigeration.

6.1.15 For Section 34.1 substitute:

A. During the Input Test the chiller shall be run at design operating conditions as stipulated on the equipment submittal drawings.

B. During the Temperature and Pressure Test, the chiller shall be run at the design chilled water leaving temperature and flow rate conditions as stipulated on the equipment submittal drawings and the chiller loaded to the rated current of the motor by adjusting the condenser water or air flow rate and/or temperature. If a variable speed drive is furnished, the compressor is to run at its design operating speed.

6.1.16 To Section 35 add: An input test is not required if the chiller is provided with a current-limiting control for the motor or if the compressor is driven by a prime mover other than an electric motor.

6.1.17 To Section 36.1 and Table 36.1 add: The temperature on the winding of an hermetic motor shall not exceed a value appropriate for the insulation system or for the refrigerant and oil employed.

6.1.18 To Section 39 add: The dielectric withstand test on the main motor may be conducted by the Laboratory at the motor manufacturer's plant if an open drive motor, or the chiller manufacturer's plant if an hermetic motor after final assembly of the motor in its enclosure. During the test low voltage circuits, motor sensor elements, and signal input circuits are to be connected to the enclosure.

6.1.19 To Section 39.1 add:

C. Test potential may be 20% higher for a period of one second when the test is performed in the manufacturer's plant.

D. Test potential shall be 85% of that in A, B, or C when the test is performed in the field.

6.1.20 For Section 51.3 substitute: Parts exposed to high side refrigerant pressure shall withstand, without failure, a pressure equal to five times the factory test pressure for the high side of the refrigeration system.

6.1.21 For Section 51.5 substitute: A refrigerant-

containing component having a marked design pressure shall withstand, without failure, a pressure equal to three times the working pressure.

6.1.22 For Section 51.6 substitute: High side parts of a liquid chiller provided with a pressure limiting device required for compliance with Section 28.1 shall withstand, without failure, a pressure equal to three times the maximum setting to which the pressure limiting device may be readily adjusted by the adjusting means provided for centrifugal and screw equipment and five and one-half times for reciprocating equipment.

6.1.23 For Section 51.13 substitute: Parts exposed to low side refrigerant pressure shall withstand, without failure, a pressure equal to three times the design pressure of the low side of the refrigeration system.

6.1.24 To Section 51.15 add: If results of tests of samples of a refrigerant containing part are not readily available from the manufacturer, the Laboratory shall be responsible for obtaining samples and for testing. Samples subjected to such strength tests may not be used on the equipment being investigated.

6.1.25 For Section 55 substitute the following: Every liquid chilling unit, whether assembled in the manufacturer's plant or erected on the premises, shall be subjected to the Field Test stipulated in Section 12 of ANSI B9.1 Safety Code for Mechanical Refrigeration.

6.2 Deletions.

6.2.1 The following sections of UL 465 Standard for Safety, Central Air Conditioners are not applicable to liquid chilling units described in this procedure since such chillers do not include components located in the air stream serving the conditioned space: 9, 21.2, 21.3, 24.3, 27.8, 32.1, 33, 36.10, 42 and 55.3.

6.2.2 The provisions of Section 5 of NEMA Standards Publication Nos. 21 and 22 covering turbine sound pressure levels are not included as a requirement in this procedure.

6.2.3 The provisions of Section 91 of ANSI B176.1 (NFPA No. 37) covering fire extinguishers are not included as a requirement in this procedure.

****1101-79 BCR**

***REFERENCE STANDARD RS 13-12**

ANSI C33.14/UL 484 - 1982 Room Air Conditioners.

***913-82 BCR; Local Law 80-1973**

***REFERENCE STANDARD RS 13-13**

**ANSI B191.1/UL 559 - 1975 Standard for Heat Pumps. Revision October 1981.

***913-82 BCR; Local Law 80-1973**

****As enacted but superceded by UL 1995 Heating and Cooling Equipment**

***REFERENCE STANDARD RS 13-14**

**ANSI Z251.1/UL 883 - 1980 Standard for Fan Coil Units and Room Fan-Heater Units. Revision February 1982.

***913-82 BCR; Local Law 80-1973**

****As enacted but superceded by UL 1995 Heating and Cooling Equipment**

***REFERENCE STANDARD RS 13-15**

ANSI B124.1/UL 900 - 1977 Standard for Test Performance of Air Filter Units. Revision December 1980.

***913-82 BCR; Local Law 80-1973**

***REFERENCE STANDARD RS 13-16**

ANSI/NFPA 17-1980 Standard for Dry Chemical Extinguishing Systems.

*** 913-82 BCR; Local Law 80-1973**